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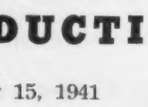

STEEL

ESTABLISHED 1882

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PRODUCTION • PROCESSING • DISTRIBUTION • USE

Packard Shaves *and* Merlin Ticks

SWEETEST music to a fighter pilot's ear just before the take-off is the smooth ticking-over of his warming engine that signals him that every vital part of his engine is "Right."

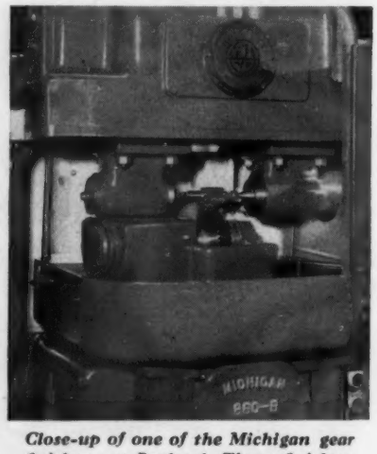
When, on August 2nd, Packard's first Rolls-Royce "Merlin" was started from London by radio, its sweet ticking was music to many ears. Music to the pilots who will soon be flying behind them by the hundreds and thousands.

Music to Packard's Design and Tool Engineers, who in ten short months had magically transformed a bundle from Britain—2000 left-handed blueprints—into an engine built by American mass production methods on American machines to the closest of tolerances.

That ticking brought to within a short step the time when identical "Merlins" by the hundreds and thousands will swing off the end of Packard's new line—smoothly ticking Merlins equipped with gears shaved on a battery of Michigan rotary gear finishers to match the rigid specifications of Packard's new aircraft engine.

Above, left: Part of the battery of Michigan 860-B rotary gear shavers used at Packard for finishing gears for the new Rolls-Royce 'Merlins'.

Right: Packard's first Rolls-Royce 'Merlin' being readied for its first official test.



Close-up of one of the Michigan gear finishers at Packard. These finishers employ the famed Michigan crossed axis shaving principle.

MICHIGAN TOOL COMPANY 7171 E. McNICHOLS ROAD DETROIT, MICHIGAN

HIGHLIGHTING
THIS ISSUE OF
STEEL

■ CONFUSION surrounding the extent of shortages of metals and other strategic materials is expected to be dispelled when the Supply Priorities and Allocations Board completes its survey of the raw materials, labor and machinery requirements for the emergency. It is interpreted **(p. 29)** as a move to end hoarding by the Army and Navy. All preference ratings have been made mandatory to facilitate strict enforcement of priority rules and regulations . . . . Filing of priority forms is having the effect **(p. 191)** of wiping considerable duplicate tonnage from mill books. Some mills with diversified production find total priority orders will require only 40 to 60 per cent of September tonnage, leaving a considerable amount of steel for nondefense use.

• • •

Segregating Alloy Scrap

More careful segregation of alloy steel scrap to conserve alloying elements is being investigated **(p. 38)** by OPM officials . . . . Priority ratings which will help a number of metalworking companies were granted last week. Foundry equipment manufacturers **(p. 41)** were assigned A-1-b and A-1-c ratings for certain scarce items. A new maintenance and repair order **(p. 36)** grants priority assistance designed to prevent any breakdown in any defense industry . . . . Leading automobile builder **(p. 31)** through design revisions and the curtailment in production has effected a saving of 105,000 tons of nine strategic metals.

• • •

Exposition in Cleveland

August steel production **(p. 33)** established another record . . . . Government expenditures for defense **(p. 49)** is mounting steadily and last month totaled $1,172,000,000 . . . . Association of Iron and Steel Engineers will meet in Cleveland next week. They will have the opportunity of visiting Otis Steel Co.'s Riverside division **(p. 106)** a self-contained plant. Many new products of interest to steel plant operators **(p. 128)** will be on display at the exposition in Cleveland Public Auditorium. Twenty-seven papers **(p. 140)** are scheduled . . . . Motor car builders and partsmakers **(p. 46)** are achieving volume production of aircraft parts. One aircraft builder has tripled **(p. 48)** its production rate on pursuit planes.

• • •

Rangefinder Is Analyzed

Professor Macconochie analyzes **(p. 59)** a naval rangefinder in his second section of fire-control instruments . . . . Fred Merish tells **(p. 62)** how relatively small devices are permitting important increases in production efficiency in many plants and describes examples . . . . The first section of a new series on heating and heat treatment of ordnance begins **(p. 72)** this week with a presentation of methods and equipment for forging, nosing and tapering projectiles . . . . The fourth article by E. W. P. Smith on how to get the most from arc welding **(p. 88)** shows how poor fitup can raise welding costs. Economics of good fitup are explained.

• • •

Assembly Line For Warplanes

Recent developments in tank engineering **(p. 58)** that make United States Army tanks second to none are described by Brig. Gen. G. M. Barnes . . . . Bell Aircraft Corp.'s new Niagara Falls plant shows **(p. 79)** how the automotive development of the constantly moving assembly line has been adopted successfully by the aviation industry to mass produce one of today's fastest and most deadly warplanes . . . . Basic open-hearth roofs have important advantages **(p. 64)** . . . . Carbon and graphite have many important new uses **(p. 66)**, according to Frank J. Vosburgh.

A thousand airplane motors a month will soon be streaming from Buick's new plant.

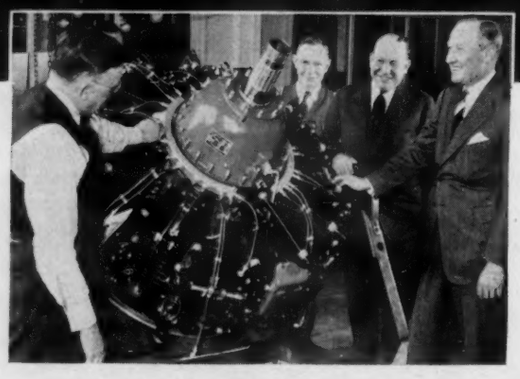
Steel from INLAND Helps Build Buick's Chicago Aviation Plant

Less than a year ago Inland was almost wholly engaged in making steel for normal commercial uses. Today, it is quite different. Inland with the same loyal spirit shown by the vast majority of industry throughout the country, is doing everything within its power to advance the Defense Program.

That is why Inland rushed from its mills more than 5,000 tons of steel for fabrication into buildings for Buick's Airplane Motor Works at Melrose Park, Illinois. This enormous plant, now nearing completion, will employ 10,000 workers who will machine, assemble, and test 1,000 Pratt & Whitney motors a month.

This is typical of many new and urgent demands for tonnage coming to Inland in a steadily increasing volume. Inland knows that National Defense is its No. 1 Job and its business is being managed accordingly.

However, after satisfying these needs we are, to the best of our ability, proportioning our remaining steel equitably among our many customers who are engaged in non-defense industries.



A 1200-hp. twin row aviation motor such as will be built by Buick.

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Census of Raw Materials, Machinery, Labor Needs Ordered by SPAB

Nelson to survey military and civilian requirements . . . All preference ratings now mandatory . . . Board halts expansion of production capacity for civilian products

■ DETAILED planning of America's defense program on the basis of accurate co-ordinated knowledge of all this country's requirements, both military and civilian, was launched last week by the seven-member Supply Priorities and Allocations Board.

The board instructed Donald M. Nelson, its executive director, to compile and organize a census of what is needed. The action puts Mr. Nelson in the top seat of the defense establishment, coming as near one man dominance of broad defense planning and operation as the country is likely to have under President Roosevelt.

Specifically, the board's order calls for action on two levels: (1) Detailed outlining as far in advance as possible of both civilian and military needs, including procurement schedules for Army, Navy and Air Force items, and including also such goods as are to be shipped abroad under the lend-lease program; (2) both military production schedules and the statements of civilian requirements are to be broken down into schedules of the raw materials, labor and machinery needed for their production.

Board's Action Salutary

Thus SPAB has adopted a policy that there must be one authority to develop the official requirement figures on both levels, holding that there would be confusion otherwise because the several parts of the requirements picture would be developed by separate agencies.

The census of requirements, SPAB members expect, will clear away much of the confusion existing in connection with shortages of many materials, especially metals. In the case of steel, for example, it is difficult to obtain figures as to what uses are being made of how much steel, and what prospective shortages are likely to develop. Lack of such information has been a tremendous handicap to priority control.

The study also is interpreted as a move to end hoarding by the Army and Navy. It long has been complained that the services acquired steel, copper and other materials far in excess of their early needs and that this resulted in unnecessary curtailment of civilian production.

SPAB's action generally is regarded as salutary in industrial circles, although there is little hope that the tight situation in strategic metals supply will be eased soon. This was recognized last week in scores of meetings throughout the country, ranging from small local groups of manufacturers conferring with their trade association executives to a mammoth priorities forum in Chicago (see page 30), attended by 3500.

Problems presented at these meetings were much the same: How to obtain priorities for defense manufacture; and how to convert facilities from civilian to defense production if materials can not be obtained. Imminent shutdowns or drastic curtailments were reported by a variety of nondefense manufacturers. A slide fastener producer in the East, who had recently expanded his plant, was forced to lay off 500 employes because of inability to obtain nickel silver, copper, zinc and plant equipment.

Preference Rating Mandatory

The musical instrument industry in Elkhart, Ind., is threatened with extinction within four to six weeks unless brass can be obtained, according to one manufacturer.

That these and thousands of other "priorities victims" be not needlessly sacrificed, the Priorities Division last week took several steps to improve the working of the system. All preference ratings were made mandatory by order of Mr. Nelson. Previously mandatory ratings were assigned only for Army and Navy contracts; ratings for civilian production, foreign governments, or for other United States governmental contracts were based upon voluntary co-operation.

Making all ratings mandatory will facilitate strict enforcement of all priority rules and regulations. It indicates increased emphasis is to be put on enforcement of orders and in compliance by all affected. The new provision is incorporated in Priorities Regulation No. 2 which also: (1) Declares valid all preference rating certificates being issued during the period of transition over the signature of E. R. Stettinius Jr., former priorities director; (2) provides specifically for stamping preference rating on application blanks if this is necessary to avoid delays in making out complete preference rating certificates.

To Give 48-Hour Service

Mr. Nelson also has made other arrangements to speed action on preference rating applications. Over the week end top members of the Priorities Division staff worked over time to clear up thousands of applications which had become "bottlenecked" during the past several weeks. Hereafter the priorities officials expect that all ordinary applications or inquiries will be handled within 48 hours of receipt, which will make it possible for businessmen to get prompt answers to questions without going to Washington.

In line with the tightening supply situation, SPAB has ordered curtailment of certain construction. Expansion of productive capacity to meet purely civilian demand cannot be undertaken now if the expansion would require large quantities of material critically needed for defense.

Board also is reported to have rejected the request of Petroleum Co-ordinator Ickes for steel plate required for the proposed pipe line from Texas to the eastern seaboard. While the rejection is not final and the case will be considered again this week, the board's delay is in sharp contrast to many previous actions authorizing construction before the need was definitely determined.

"Shortages Are Real, Not Fancied . . . Less Essential Products Must Go"

CHICAGO

■ ANY doubt as to whether iron, steel and nonferrous metals supply is adequate to meet rapidly increasing demands of national defense was dispelled very convincingly by government spokesmen addressing 3500 Midwestern business men attending a priorities meeting here, Sept. 9. Warning was given that not enough material can be produced to supply both military and civil needs, and that civilian sacrifices must result.

Held in the Civic Opera House, which was packed, the meeting was for the purpose of giving manufacturers expert guidance on the confusing problems relating to priorities and Defense Supplies Rating Plan. Largest priorities forum conducted so far in the country, it was an outpouring largely of small manfacturers who are fearful their business will be closed by inability to get material. Meeting was sponsored by the Illinois Manufacturers' Association, Purchasing Agents' Association of Chicago and Central States Mill Supply Association.

OPM speakers from Washington included Joseph L. Overlock, administrator, Defense Supplies Rating Plan and assistant deputy director, Priorities Division; H. K. Clark, senior consultant, Priorities Division; Stanley Adams, priorities specialist for steel and iron section; Mason Manghum, chief of industrial contract and education unit; Lawrence J. Martin, in charge of compliance and in charge of field offices for the Priorities Division; and Edward Scriven, assistant to Mr. Martin. W. Homer Hartz, Chicago, district OPM coordinator, presided.

Says Material Shortages "Real"

Mr. Overlock stated that scarcity of materials vital to rearmament will grow more serious and that "the shortages are real, not fancied. There is no use trying to hide the shortage. Some civilian uses will have to be sacrificed. The less essential products must go."

Continuing, he declared that only 3 or 4 per cent of the nation's aluminum production remains after military consumption, and that the outlook for additional supplies for civilian use is not encouraging. He said the scarcity of aluminum and magnesium is most serious, although present plans are for expanding aluminum next year to four times the 1940 output, and magnesium sevenfold.

In spite of this gloomy picture, Mr. Overlock asserted that civilian needs for metals must be taken care of as adequately as possible.

Announcement was made by Mr. Adams that iron and steel scrap shortly will be subjected to mandatory allocation control. The plan will apply to the purchases of scrap by consumers and even to the disposition which producers of scrap may make of their accumulations. It also will include provisions for accumulation of a pool from which scrap can be supplied to consumers experiencing acute shortage.

Another order being prepared, Mr. Adams stated, will provide steel construction materials for the building, rebuilding, and maintenance of blast furnaces to insure an adequate supply of pig iron.

Referring to the recent allocation of pig iron, he asserted that every consumer, whether engaged in defense or nondefense work, got some iron, providing his inventory was less than 45 days' supply. Iron was denied to those having more than this inventory. It was discovered that some users had 8 to 10 months' supplies on hand. Requests for iron to be shipped in September totaled 900,000 tons, which is at the rate of 10,000,000 tons a year, a figure which is far above any merchant consumption in the past.

Discussing the new supplemental order, M-21-b, covering warehouses, Mr. Adams said considerable confusion appears to exist. Warehouses are regarded as a legitimate and essential source of supply, particularly to small manufacturers, and purpose of the order, long in the making, is to insure their obtaining adequate supplies. Distributors are permitted and expected to sell to both defense and civilian customers and Mr. Adams emphasized that no one who buys steel from a warehouse needs a preference certificate.

Demand for Steel Increasing

It was estimated by Mr. Adams that probably not more than 40 per cent of all steel being sold today is covered by preference rating, and of the remainder a good portion is going to civilian use. Demand for steel, both defense and civilian, is increasing and will continue to increase. At present, requirements for shell and bomb steel are comparatively small, but if we get into a shooting war, this demand will be tremendous.

The speaker revealed in explaining the M-21 steel order that an alloy supplement—M-21-a—will be issued shortly and that an amendment to M-21 clarifying use of form PD-73 is in the mill.

The meeting lasted late into the night as the various speakers answered questions which had been submitted in writing. Because of lack of time, several hundred questions will be answered by mail by Washington and local officials of OPM.

■ **Thirty-five hundred Midwestern manufacturers jampacked the Chicago Civic Opera House last week to hear priorities officials interpret the new rules and regulations. They were warned to expect continued shortages of strategic materials. Kaufman & Fabry photo**

Use of Critical Metals Sharply Cut By Revised Auto Production Methods

By C. L. McCUEN
Vice President in Charge of Engineering
General Motors Corp.

■ A WORLD situation, such as we now face, has a serious effect on the use of metals. Practically all are affected in some way, either because increased demand for defense purposes requires the entire supply of those metals normally abundant or because we are dependent on procuring them from other countries.

Some persons may be critical of the automobile industry for bringing out new models at this time. The question is asked why didn't we just continue with what we were producing. The answer is that we could not have effected the savings in metals needed for the defense program without important design changes.

The magnitude of the job may be appreciated when it is realized that, considering only nine critical metals, these design changes, together with the curtailment in volume of cars produced, will effect a saving of 210,000,000 pounds for General Motors alone. This put GM engineers, technical staff and manufacturing divisions to a real test.

One of the first materials to receive consideration was zinc, since cartridge cases and shells use tremendous quantities of 70-30 brass. In radiator grilles, door handles, carburetors, average use of zinc was over 50 pounds per car. In designing the 1942 line, grilles were changed to steel stampings, thereby helping to save about 21,000,000 pounds used for this purpose on the 1941 line. Cast iron replaced zinc in carburetors and some ornamental parts were changed to antimonial lead. We effected a saving of about 64 per cent in the entire use of zinc by redesign. This, together with the curtailment in volume of cars produced, will effect a total saving of 92,000,000 pounds.

Asked To Use More Brass

This total saving has relieved the zinc situation to such an extent that the government is now asking us to use more brass to help relieve the copper situation.

One General Motors division furnishes fuel pumps for almost the entire automotive industry. The bodies of these pumps required about 9,000,000 pounds of zinc for the 1941 model year. As a precautionary measure, this division has designed a steel pump, composed of several steel stampings hydrogen-welded or brazed together. This produced a good pump but cast iron finally was decided upon and has been tooled up, but will not be used unless the situation becomes more critical. This same division also designed a successful pump using plastics but did not adopt it because basic materials for plastics may become scarce.

All of these jobs have been accomplished at no sacrifice of quality but at somewhat increased cost. Similarly, substituting cast iron for zinc in carburetors has been done at no sacrifice of quality but likewise at increased cost. Because zinc can be cast to almost exact size with great accuracy, requiring the minimum of machining, whereas cast iron requires a great deal of machine work to make it usable, the labor content is much higher than a similar piece in zinc.

Two Uses for Aluminum

The next material to receive attention was aluminum. Although at one time supplies were considered adequate, the rapidly expanding aircraft program soon made it apparent there would be a real shortage of aluminum. We use aluminum in two important ways—in pistons and as a deoxidizing agent in practically all sheet steel to a greater or lesser degree, depending on its ultimate use.

We have two materials available for pistons besides aluminum, namely, cast iron and a somewhat newer material called Arma-steel, a pearlitic malleable iron, developed by the Saginaw Malleable Iron Division. Both of these materials are heavier than aluminum. In one particular design, cast iron is about 84 per cent heavier and Arma-steel 42 per cent. The latter can be cast in lighter sections because of its greater strength.

Saving aluminum in killed steel has been accomplished by changing methods of tooling. Some parts formerly made in one piece will be made in two pieces. Sheet steel rolled from rimmed heats is not affected as these steels require only about ½ to ¾ of a pound average of aluminum per ton of steel. Zinc die castings use about 4 per cent aluminum. This has been reduced to 1½.

Nickel is a critical item and we have changed plating methods to conserve about 66 per cent in that one operation.

Chromium, to a large extent, depends on imports and must be conserved. This cannot be reduced except by the reduction of bright surface area. Present practice for plating averages 20 millionths of an inch. This requires less than one-fifth of a pound for plating per car on an average.

A larger amount of chromium is found in stainless steel used for various bright finished moldings and ornaments; an average of more than 2 pounds of chromium per car being used for this purpose. There is some discussion in Washington about asking the industry to reduce the amount of bright finish. It has been proposed to have an industry-wide agreement to reduce the amount of plating on bright parts simultaneously.

New Low Alloy Steels Employed

On the general subject of steel, especially alloy steel, one of our divisions has followed a policy of eliminating older alloy steels and replacing them with newer low-alloy steels. For the past ten years this company has been gradually adopting—first in one part and then another—steels containing 1.60-1.90 per cent manganese as replacement for nickel steels so that today this division has all of the important power transmitting and heavy-duty parts made from this 1.60-1.90 per cent manganese steel or some modification of it.

The principal difficulty is that these remaining steels must be held to close limits on specifications, and heat treating will have to be held in narrower ranges, both of which can be done. We can retain the quality and durability but at increased cost. Although the government has not as yet placed manganese on priority, such an occurrence is anticipated; therefore, work is being done as rapidly as possible to determine what steels are to be used when the amount of manganese permitted in steel is reduced.

Chromium has recently been placed on priority, which means that it will not be available for alloy steels in civilian use. It may well be asked under these circumstances if we cannot use nickel, chromium, or more than 1 per cent manganese—how are we going to get steel strong enough to take the place of the alloy steels now being used?

In answer to that question, it may be pointed out that the principal

(*Please turn to Page* 208)

Condensed from an address presented at an editorial conference and defense demonstration held by General Motors at its proving grounds near Milford, Mich., Sept. 10, with 400 editors and writers in attendance.

First-Half Pig Iron Output Up 29.9 Per Cent

■ PIG IRON production in the first half of 1941 was 29.9 per cent larger than in the corresponding period of 1940, totaling 26,693,932 net tons, compared with 20,556,849 tons, according to the American Iron and Steel Institute. Output of ferroalloys increased 6.7 per cent, from 681,525 tons to 727,107 tons.

Pennsylvania led pig iron production in the first six months this year, with 8,118,019 tons; Ohio was second with 6,273,896 tons; Illinois third, 2,496,619 tons; Alabama fourth, 1,826,038 tons.

Pig iron made for producer's use increased 26.8 per cent, from 18,172,468 tons to 23,048,513 tons and tonnage made for sale rose 52.9 per cent, from 2,384,381 tons to 3,645,419 tons.

Ferroalloys produced in electric furnaces amounted to 296,295 tons, representing 40.7 per cent of the total, compared with 27.4 per cent in first half, 1940. Blast furnace ferroalloy production was 430,812 tons in first half this year, 59.3 per cent of the total, compared with 72.5 per cent in first half last year.

HALF-YEARLY PRODUCTION OF PIG IRON AND FERRO-ALLOYS BY STATES

States	Blast furnaces (a)				Production		
	In blast Dec. 31, 1940	June 30, 1941 In	June 30, 1941 Out	June 30, 1941 Total	First 6 months 1940	Second 6 months 1940	First 6 months 1941
PIG IRON:							
Mass.	1	1	0	1	1,293,618	1,819,384	1,778,128
New York	13	15	0	15			
Penna.	61	62	7	69	6,448,392	7,839,434	8,118,019
Maryland	6	6	0	6	1,743,147	1,832,834	1,821,422
West Va.	3	3	0	3			
Kentucky	2	2	0	2			
Tennessee	1	1	0	1			
Alabama	17	17	2	19	1,584,935	1,833,960	1,826,038
Ohio	44	45	1	46	4,269,739	5,699,965	6,273,896
Illinois	15	18	5	23	1,687,167	2,360,209	2,496,619
Indiana	18	19	0	19	3,062,445	3,625,262	3,815,595
Michigan	8	7	1	8			
Minnesota	2	2	0	2	467,406	503,769	564,215
Iowa	0	0	0	0			
Colorado	3	3	0	3			
Utah	1	1	0	1			
Total	195	202	16	218	20,556,849	25,514,817	26,693,932
FERRO-ALLOYS:							
New York	0	0	0	0	312,863	264,682	318,320
Penna.	7	8	0	8			
Virginia	1	1	0	1	181,704	148,176	112,492
Tennessee	1	1	1	2			
Alabama	0	0	0	0			
Ohio	2	2	0	2			
Colorado	0	0	0	0			
Blast furnaces	11	12	1	13	494,567	412,858	430,812
Electric furnaces	....	....	....	....	186,958	232,480	296,295
Total	11	12	1	13	681,525	645,338	727,107
Grand total	206	214	17	231	21,238,374	26,160,155	27,421,039

(a) Completed and rebuilding pig iron furnaces.

NOTE—Of the 17 furnaces which were idle on June 30, 1941, 6 were relining and 4 rebuilding.

HALF-YEARLY PRODUCTION OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS

BASIC PIG IRON

States	First 6 months 1940	Second 6 months 1940	First 6 months 1941
Massachusetts, New York	834,839	1,145,289	1,042,232
Pennsylvania	4,538,815	5,469,590	5,767,861
Maryland, West Virginia, Ky., Ala.	2,570,411	2,751,789	2,720,830
Ohio	3,018,345	3,679,745	4,050,440
Indiana, Illinois	3,432,332	4,476,212	4,603,044
Michigan, Minnesota, Colorado, Utah	1,033,890	1,036,477	1,067,139
Total	15,428,632	18,559,102	19,251,546

BESSEMER AND LOW-PHOSPHORUS PIG IRON

Pennsylvania	1,644,628	2,203,748	2,121,275
Mass., N. Y., Md., West Va., Ala.	325,765	476,445	527,217
Ohio	961,735	1,548,474	1,711,338
Indiana, Illinois	263,427	411,054	461,408
Total	3,195,555	4,639,721	4,821,238
Total Bessemer	3,035,114	4,351,206	4,564,998
Total Low-Phosphorus	160,441	288,515	256,240

FOUNDRY PIG IRON

Massachusetts, New York, Penna.	254,117	220,849	301,692
Kentucky, Tenn., Ala.	557,043	680,369	700,601
Ohio	80,380	121,795	101,844
Indiana, Ill., Mich., Minn., Col., Utah	156,210	221,412	267,627
Total	1,047,750	1,244,425	1,371,764

MALLEABLE PIG IRON

Massachusetts, New York, Penna.	264,808	354,421	295,070
Ohio	204,657	342,170	392,048
Indiana, Illinois, Minnesota	327,181	339,164	472,553
Total	796,646	1,035,755	1,159,671

FERRO-ALLOYS BY KINDS

Ferro-manganese	281,141	228,935	244,652
Spiegeleisen	129,009	107,811	75,376
Ferro-silicon	236,146	262,686	347,055
Other ferro-alloys	35,229	45,906	60,024
Total	681,525	645,338	727,107

PRODUCTION OF PIG IRON AND FERRO-ALLOYS IN THE FIRST 6 MONTHS OF 1941

(For Sale and for Maker's Use)

	For sale	For maker's use	Total
PIG IRON:			
Basic	777,794	18,473,752	19,251,546
Bessemer and low-phosphorus	531,474	4,289,764	4,821,238
Foundry	1,218,542	153,222	1,371,764
Malleable	1,054,196	105,475	1,159,671
Forge or mill	63,413	26,300	89,713
White and mottled, direct castings, etc.			
Total	3,645,419	23,048,513	26,693,932
FERRO-ALLOYS:			
Ferro-manganese and spiegeleisen	185,944	134,084	320,028
Ferro-silicon	344,616	2,439	347,055
Other ferro-alloys	60,024	....	60,024
Total	590,584	136,523	727,107
Grand total	4,236,003	23,185,036	27,421,039

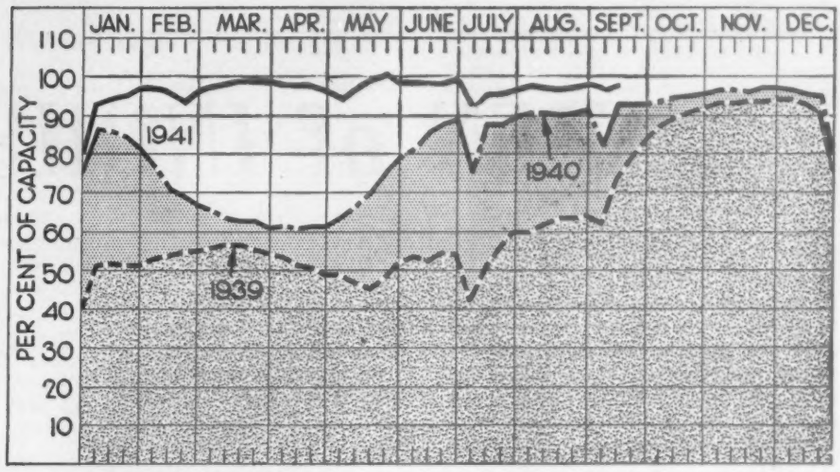
New August, Eight Month Record in Steel Ingots

■ Steel ingot production in August totaled 7,000,957 net tons, a new record for that month, more than 13 per cent over 6,186,383 tons made in August, 1940. This brought the eight months' total to a record-breaking 54,731,182 tons, 32 per cent larger than 41,316,410 tons in the comparable period last year, according to figures of the American Iron and Steel Institute.

Eight months' production is 24 per cent larger than the previous high record, 44,137,164 tons, in the first eight months of 1929, and almost 10 per cent larger than 49,787,196 tons in the full year 1917.

The operating rate for the industry in August was 95.7 per cent of capacity, compared with the revised rate of 93.4 per cent in July, 1941, and 89.5 per cent for August, 1940.

The operating rate for July and August this year was computed on the basis of annual capacity as of June 30, 1941, a total of 86,144,900 net tons.



PRODUCTION . . . . Up

■ PRODUCTION of open-hearth, bessemer and electric furnace steel last week advanced 1 point to 96½ per cent. Three districts gained, one declined and eight were unchanged. A year ago the rate was 93 per cent; two years ago it was 74 per cent.

Youngstown, O. — Increased 2 points to 98 per cent.

Central eastern seaboard—Slight shifts in production made no change, the rate holding at 95 per cent.

Birmingham, Ala. — Continued at 95 per cent, 23 open hearths on.

New England—Steady at 90 per cent of capacity.

Chicago — Unchanged at 101 per cent. Four of the six plants are at 100 per cent or higher.

St. Louis — Held steady at 98 per cent with no change indicated.

Buffalo — With 39 of 43 open hearths in production the rate remains at 90½ per cent.

Cleveland — Loss of an open hearth the entire week and another for half the week reduced the rate 3 points to 92 per cent.

Detroit — Rose sharply to 94 per cent, a gain of 8 points.

Pittsburgh — Production gained 1 point to 99 per cent last week.

Wheeling — No change took place in steel production, the rate remaining at 94 per cent.

Cincinnati — Remained steady at 89 per cent, which has been varied only slightly for several weeks.

Steel Ingot Statistics

	Estimated Production—All Companies								Calculated weekly production, all companies	Number of weeks in month
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	
Based on Reports by Companies which in 1940 made 92.91% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1941										
Jan. ..	6,276,429	99.1	451,637	76.0	200,019	91.0	6,928,085	96.9	1,563,902	4.43
Feb. ..	5,673,289	99.2	378,330	70.5	186,281	93.9	6,237,900	96.6	1,559,475	4.00
Mar. ..	6,461,936	102.0	460,169	77.4	209,536	95.4	7,131,641	99.7	1,609,851	4.43
1st quar	18,411,654	100.1	1,290,136	74.8	595,836	93.4	20,297,626	97.8	1,578,353	12.86
Apr. ..	6,135,941	100.0	395,009	68.6	225,999	106.2	6,756,949	97.6	1,575,046	4.29
May ..	6,365,172	100.5	444,361	74.8	243,705	110.9	7,053,238	98.7	1,592,153	4.43
June .	6,103,767	99.5	458,242	79.6	238,721	112.2	6,800,730	98.2	1,585,252	4.29
2nd qtr	18,604,880	100.0	1,297,612	74.3	708,425	109.8	20,610,917	98.2	1,584,237	13.01
1st half	37,016,534	100.1	2,587,748	74.5	1,304,261	101.6	40,908,543	98.0	1,581,312	25.87
July ..	6,089,859	96.6	489,239	85.0	242,584	87.4	6,821,682	93.4	1,543,367	4.42
Aug. .	6,243,100	96.6	495,523	85.9	262,334	94.4	7,000,957	95.7	1,580,351	4.43
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1940										
Jan. ..	5,356,444	85.7	285,447	56.1	122,832	77.0	5,764,723	83.4	1,301,292	4.43
Feb. ..	4,208,249	72.1	205,458	43.2	112,090	75.2	4,525,797	70.0	1,093,188	4.14
Mar. ..	4,078,843	65.3	191,568	37.6	118,772	74.5	4,389,183	63.5	990,786	4.43
1st quar	13,643,536	74.4	682,473	45.7	353,694	75.6	14,679,703	72.3	1,129,208	13.00
Apr. ..	3,808,031	62.9	176,419	35.8	116,024	75.1	4,100,474	61.2	955,821	4.29
May ..	4,583,771	73.4	258,741	50.8	125,270	78.5	4,967,782	71.8	1,121,395	4.43
June .	5,222,120	86.3	305,115	61.9	130,208	84.3	5,657,443	84.5	1,318,751	4.29
2nd qtr.	13,613,922	74.2	740,275	49.5	371,502	79.3	14,725,699	72.5	1,131,875	13.01
1st half	27,257,458	74.3	1,422,748	47.6	725,196	77.4	29,405,402	72.4	1,130,542	26.01
July ..	5,269,701	84.5	322,567	63.5	132,357	83.2	5,724,625	83.0	1,295,164	4.42
Aug. ..	5,670,932	90.8	369,770	72.6	145,681	91.3	6,186,383	89.5	1,396,475	4.43
Sept. .	5,535,198	91.7	365,289	74.2	155,759	101.1	6,056,246	90.6	1,415,011	4.28
3rd qtr.	16,475,831	89.0	1,057,626	70.1	433,797	91.7	17,967,254	87.7	1,368,412	13.13
9 mos.	43,733,289	79.2	2,480,374	55.1	1,158,993	82.2	47,372,656	77.5	1,210,339	39.14
Oct. ..	6,059,792	97.0	408,317	80.2	176,433	110.6	6,644,542	96.1	1,499,897	4.43
Nov...	5,872,162	97.1	420,448	85.3	176,497	114.2	6,469,107	96.6	1,507,950	4.29
Dec. ..	5,907,840	94.8	399,434	78.6	188,083	118.2	6,495,357	94.1	1,469,538	4.42
4th qtr.	17,839,794	96.3	1,228,199	81.3	541,013	114.3	19,609,006	95.6	1,492,314	13.14
Total..	61,573,083	83.5	3,708,573	61.7	1,700,006	90.3	66,981,662	82.1	1,281,210	52.28

The percentages of capacity for 1940 are calculated on weekly capacities of 1,410,130 net tons open hearth, 114,956 net tons Bessemer and 36,011 net tons electric ingots and steel for castings, total 1,561,097 net tons; based on annual capacities as of Dec. 31, 1939 as follows: Open hearth 73,721,592 net tons. Bessemer 6,009,920 net tons, electric 1,882,630 net tons.

The percentages of capacity operated in the first six months of 1941 are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of Dec. 31, 1940 as follows: Open hearth 74,565,510 net tons, bessemer 6,996,520 net tons, electric 2,586,320 net tons. Beginning July 1, 1941, the percentages of capacity operated are calculated on weekly capacities of 1,459,132 net tons open hearth, 130,292 net tons bessemer and 62,761 net tons electric ingots and steel for castings, total 1,652,185 net tons; based on annual capacities as of June 30, 1941 as follows: Open hearth, 76,079,130 net tons, bessemer 6,793,400 net tons, electric 3,272,370 net tons.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Sept. 13	Change	Same week 1940	Same week 1939
Pittsburgh	99	+ 1	87	70
Chicago	101	None	97.5	67
Eastern Pa. ...	95	None	90.5	57
Youngstown ...	98	+ 2	86	75
Wheeling	94	None	98	86
Cleveland	92	— 3	89	83
Buffalo	90.5	None	90.5	67
Birmingham ..	95	None	93	80
New England ..	90	None	75	75
Cincinnati	89	None	82	68
St. Louis	98	None	80	62
Detroit	94	+ 8	95	99
Average	96.5	+ 1	93	74

MEN of INDUSTRY

■ **EDWARD I. EVANS,** manager, Gulfsteel district, Republic Steel Corp., has been placed in charge of a newly created southern district, which will include operations in both Gadsden, Ala., and Birmingham. He will continue to make his headquarters in Gadsden.

B. W. Norton, heretofore assistant manager in the Warren district, will become general superintendent of blast furnaces and mines in the southern district, with headquarters in Birmingham.

A. G. Delany, assistant district manager at Gadsden, will become general superintendent of the steel mills at Gadsden.

The reorganization and appointments follow resignation of **C. L. Bransford** as manager of the Birmingham district.

♦

Frank Huston has resigned as president, Barium Stainless Steel Corp., Canton, O.

♦

Philip J. Burns has been appointed public relations director, Oldsmobile division of General Motors Corp.

♦

Frank H. Miller, formerly assistant manager, Pig Iron and Coke Sales Division, American Rolling Mill Co., Middletown, O., is now associated with David J. Joseph Co., Cincinnati.

♦

C. T. Hapgood has been appointed assistant district sales manager, Houston, Tex., office of Jones & Laughlin Steel Corp. He formerly held the same position at Los Angeles. At the same time, **W. R. K. Scott** has been transferred from the Houston office to Los Angeles.

Edward I. Evans

♦

H. L. Kinney, affiliated with the S. K. Wellman Co., Cleveland, in various sales capacities since 1921, has been named manager of the company's Machine Tool Division.

♦

Charles BeHannesy has joined the engineering staff of Rowe Radio Research Laboratory Co., Chicago, and will assist in general laboratory research work.

♦

H. V. Cummings has been named general sales agent, Graham Nail & Wire Products Ltd., Toronto, Ont., succeeding the late E. A. Smith.

♦

William K. Cusick has joined International Rustproof Corp., Cleveland, and will be in charge of engineering and sales for the Irco Zinc Coat Division. He formerly was associated with Parker Rustproof Co.

♦

W. E. Sault, assistant to the general purchasing agent, and **F. H. Janke,** treasurer, American Brake Shoe & Foundry Co., New York, were guests of honor at a luncheon given by **William B. Given Jr.,** president, to celebrate their fortieth anniversary with the company.

♦

John W. Bates, formerly superintendent of the Irvin works 80-inch hot strip mill, Carnegie-Illinois Steel Corp., has been appointed assistant to the general superintendent, Homestead, Pa., works. He has been associated with United States Steel Corp. subsidiaries 14 years.

♦

A. A. Browne, the past two years steam engineer, Westinghouse Electric & Mfg. Co., has been appointed assistant manager of the company's central station and transportation divisions for the Pacific coast district, with headquarters in San Francisco.

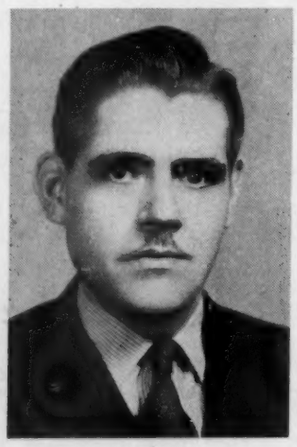
♦

Eugene E. Everett, formerly process engineer and metallurgist, Muncie Gear Works, Muncie, Ind., has joined A. F. Holden Co., New Haven, Conn., in the same capacity. Prior to joining the Muncie company, Mr. Everett was associated with General Motors Corp. and Chrysler Corp.

♦

J. R. Paisley has been elected secretary and assistant treasurer and

C. T. Hapgood



William K. Cusick

Eugene E. Everett

a director, Broden Construction Co., Cleveland, a subsidiary of Wean Engineering Co. Inc., Warren, O. Mr. Paisley has been treasurer, Culver Aircraft Corp., Wichita, Kans., and previously was auditor, National Fireproofing Corp. He also was secretary, Aetna-Standard Engineering Co.

♦

Robert E. Griffin, formerly production manager, Olds Motor Works, Lansing, Mich., has been named works manager, and **John Dykstra** has been appointed factory manager, to replace **S. A. Woodmancy,** retired. **C. A. Blake,** heretofore assistant manager, St. Louis zone, has become assistant to works manager.

♦

Coolidge Sherman has been appointed eastern sales manager, Allegheny Ludlum Steel Corp., Pittsburgh. In his new capacity, Mr. Sherman will act as co-ordinator of sales in all districts of the eastern

Coolidge Sherman

seaboard, including Allegheny Ludlum offices in Birmingham, Atlanta, Philadelphia, New York and Springfield, Mass., and distributors located in these districts. Associated with the company since graduation from Yale university in 1916, Mr. Sherman formerly was manager of valve steel sales.

♦

Dr. H. W. Gillett, chief technical advisor, Battelle Memorial Institute, Columbus, O., has accepted the invitation of the Institute of British Foundrymen to present the fifth Edward Williams lecture in 1942. He is the first American, in fact the first outside of Britain, to be so honored. The lecture was founded by C. E. Williams of South Wales, an institute past president, and until outbreak of the war was presented annually by a prominent scientist.

Steel Corp. Sets August And Eight Months Record

■ United States Steel Corp. shipments of finished steel in August were 1,753,665 net tons, an all-time monthly record, 86,998 tons, 5.2 per cent, above 1,666,667 tons shipped in July and 20.5 per cent greater than 1,455,604 tons in August, 1940. For eight months ended Aug. 31 shipments totaled 13,473,209 tons, exceeding any similar period in the corporation's history, 49.03 per cent greater than 9,040,889 tons in the first eight months of 1940. The previous eight months record was 12,187,424 tons in 1929, which was exceeded by 10.6 per cent in 1941.

(Inter-company shipments not included)
Net Tons

	1941	1940	1939	1938
Jan.	1,682,454	1,145,592	870,866	570,264
Feb.	1,548,451	1,009,256	747,427	522,395
March	1,790,366	931,905	845,108	627,047
April	1,687,674	907,904	771,752	550,551
May	1,745,295	1,084,057	795,689	509,811
June	1,668,637	1,209,684	807,562	524,994
July	1,666,667	1,296,887	745,364	484,611
Aug.	1,753,665	1,455,604	885,636	615,521
Sept.	.....	1,392,838	1,086,683	635,645
Oct.	.....	1,572,408	1,345,855	730,312
Nov.	.....	1,425,352	1,406,205	749,328
Dec.	.....	1,544,623	1,443,969	765,868
Total, by Mos.	.....	14,976,110	11,752,116	7,286,347
Adjustment	.....	†37,639	*44,865	†29,159
Total	.....	15,013,749	11,707,251	7,315,506

†Increase. *Decrease.

Wisconsin Steel Works To Start New Open Hearth

■ Wisconsin Steel Works of International Harvester Co. will pour first heat Sept. 16 from new open hearth just completed at South Chicago. This is one of two built in connection with expansion in steelmaking capacity for the defense program and is the first addition to basic capacity in the Chicago district. These are 100-ton units totaling 140,000 tons annually. Invited guests, including the press, will witness ceremonies of the first heat.

Contract Opportunities

Cleveland office, OPM, lists the following steel requirements: 600 bars, random lengths, ½ x ¾ inches, cold or hot rolled, S.A.E. No. 1112 or No. 1020, annealed; two tons each, ½ oval, 3/16 x 1 inch, 16-20 feet in length; ½ oval, ¼ x 1½ inches, 16-20 feet in length; channel, 3/16 x 2 x 1 inches, 16-20 feet in length; flat, ½ x 2 inches, 16-20 feet in length; angle, 3/16 x 1½ x 2 inches, 16-20 feet in length; flat, ¼ x 2 inches, 16-20 feet in length; flat, ¼ x 1¼ inches, 16-20 feet in length; flat, ⅜ x 1¾ inches, 16 feet long; flat, ⅛ x 2 inches, 16 feet long; tee, ¼ x 1½ x 1½ inches, 16-20 feet in length; tee, ¼ x 1¾ x 1¾ inches, 16-20 feet in length; flat, ⅜ x 1¾ inches, 20 feet long; flat, ⅜ x 2 inches, 20 feet long; angle, ⅛ x 1¼ x 1¼ inches, 20 feet long; angle, ⅛ x 1 x 1 inches, 20 feet long.

Subcontract Opportunity

NT-16. Parts to be machined for 8-inch shell, requiring 3 to 5-inch, 4 or 6-spindle, automatic screw machine. Inquire Contract District Division, OPM, Federal Reserve Bank, Pittsburgh.

DIED:

■ **Walter D. Sayle,** 80, head of the Cleveland Punch & Shear Works Co., City Foundry Co., both of Cleveland; the Cleveland Crane & Engineering Works, Wickliffe, O., and Ohio Machine Tool Co., Kenton, O., Sept. 5, in Cleveland. Mr. Sayle organized the Cleveland Punch & Shear company in 1890 and seven years later founded the Cleveland Crane & Engineering Co. He purchased the City Foundry Co. in 1903 and the controlling interest in Ohio Machine Tool in 1911. He was a member, National Metal Trades Association since 1901, serving on its administrative council for several terms and as its president in 1906.

♦

Harold J. Stein, 47, director of research, chemistry and metallurgy, Allis-Chalmers Mfg. Co., Milwaukee, Sept. 9. Associated with the company 25 years, Mr. Stein directed these activities since 1939. For many years he had been a member, American Society of Testing Materials, American Foundrymen's Association and American Society for Metals, the Milwaukee chapter of which he was instrumental in founding.

♦

Alexander B. Charlton, 54, works manager, Alameda, Calif., plant of Bethlehem Steel Co., in Seattle, recently.

♦

Dr. Heinrich Koppers, famous engineer in the development of by-product coke industries, Sept. 5 at his home in Germany, at the age of 69.

♦

Peter Stewart, 66, assistant manager of operations at Worcester, Mass., plant of American Steel & Wire Co., Sept. 10, at his home in Boylston, Mass. He had been associated with the company 41 years.

♦

William Drake, 50, president and treasurer, Advance Sheet Metal & Furnace Co., Milwaukee, Sept. 7, in that city.

♦

Hugh A. Scallen, 46, district manager of the New England branch and warehouse of Jessop Steel Co., Hartford, Conn., Sept. 2. Mr. Scallen had been affiliated with the tool steel industry 23 years. He was a member, American Society for Metals.

OPM Grants Priority Assistance for Defense Plant Maintenance, Repair

■ NEW and streamlined plan to grant priority assistance for repair work in certain essential industries has been announced by Donald M. Nelson, director of priorities. It is designed to keep defense industries running at full speed, and to prevent any break in the increasing tempo of defense production.

The new plan takes the place of the Maintenance and Repair Order which was announced Aug. 8, but which was never actually issued because of administrative difficulties in handling the paper work it would have involved.

The new plan is set up along simple lines. It provides machinery under which priority status for repair work in 20 industrial classifications can be obtained, so that firms and agencies in these classifications may obtain repair parts promptly.

Plan To Protect Industries

Revised scheme permits qualified producers or suppliers to apply a preference rating of A-10 to deliveries of required repair parts by endorsing a special statement on purchase orders, certifying that the material being ordered is for repair work under the terms of the order, P-22.

Order can be used also to get deliveries for "emergency inventory."

Repairs are defined in the order as repairs needed because of an actual or imminent breakdown.

Emergency inventory is defined in the order as the minimum inventory of material required to provide for repairs to meet an actual or imminent breakdown.

Order is designed primarily to protect industry against sudden breakdowns and is regarded as an interim measure. The entire inventory problem is to be studied further with a view to providing broader priority assistance. It is felt, however, that the present plan will keep the essential industries covered running on their normal basis.

Text of order follows:

TITLE 32 — NATIONAL DEFENSE; CHAPTER IX—OFFICE OF PRODUCTION MANAGEMENT; Subchapter B — PRIORITIES DIVISION; Part 958—REPAIRS; PREFERENCE RATING ORDER NO. P-22

958.1 Preference Rating Order. For the purpose of facilitating the acquisition of Material for the Repair of the property or equipment of certain industries and services hereinafter specified, a preference rating is hereby assigned to deliveries of Material for such purpose upon the following terms:

(a) Definitions.

(1) "Producer" means any individual, partnership, association, corporation, governmental unit, or other organization engaged in one or more of the following industries and services, and such other industries and services as may be added from time to time by supplement to this Order:

(i) The following Federal, State, County, and municipal services: Fire and police services; Highway maintenance.

(ii) Carriers:

(a) Urban, suburban, interurban, and intercity common, contract, and private carriers of passengers or freight by electric railway, electric coach, motor truck, or bus, including terminals.

(b) Railroads, including terminals.

(c) Shipping—Commercial carriers of freight and passengers by ocean, lake, river, or canal, including terminals.

(iii) Chemicals—Plants engaged in producing chemicals by chemical processing of raw materials.

(iv) Coke converting.

(v) Educational institutions (including vocational training).

(vi) Explosives—plants engaged in manufacturing explosives.

(vii) Farm machinery and equipment—plants engaged in manufacturing farm machinery and equipment.

(viii) Food processing or storing—plants engaged in any of the following: milling, refining, preserving, refrigerating, wholesaling or storing of food for human consumption or livestock feed.

(ix) Highway maintenance and equipment—plants engaged in the production of equipment used in highway maintenance.

(x) Hospitals, clinics and sanatoriums.

(xi) Lumber—plants engaged in the production of lumber (including planing, drying, storing, and treating of lumber), cooperage, plywood, and millwork.

(xii) Metallurgy—plants engaged in the production of metals and alloys.

(xiii) Mines and quarries (including ore dressing or processing plants and smelting facilities).

(xiv) Newspapers — plants engaged in the publication of newspapers.

(xv) Petroleum production, refining and transportation—plants and equipment used in petroleum production, refining and transportation.

(xvi) Radio—Commercial broadcasting and communication (not including home receiving sets).

(xvii) Research laboratories—industrial and academic.

(xviii) Rubber and rubber products—plants engaged in the production of rubber and rubber products including reclaimed and synthetic rubber.

(xix) Shipyards and Ship Repair Yards engaged in building and repairing ships (excluding yards de-

(*Please turn to Page* 209)

Government Forms Are Available

●

■ Forms PD-73, PD-25-C, PD-25-D which now must be attached to every order or contract for defense supplies are available to STEEL's readers, shipments being made 24 hours after orders are received.

These forms can be obtained from STEEL, Readers' Service Department, Penton Building, Cleveland, at the following prices:

Quantity of			
100	$1.00	1,000	$3.55
200	$1.50	2,500- 5,000	$3.25 per M
300	$2.00	5,000-10,000	$2.95 per M
400	$2.50	10,000-20,000	$2.75 per M
500	$3.00	20,000 and over	$2.55 per M

NOTE: Postage is not included in above prices. If your order originates in Ohio, please include sales tax.

Form PD-83a for Listing Deliveries by Steel Warehouses

PD-83a

OFFICE OF PRODUCTION MANAGEMENT
Iron and Steel Branch
Washington, D. C.

STEEL WAREHOUSE STATEMENT OF DELIVERIES FOR FIRST QUARTER OF 1941

File, in quadruplicate for each warehouse owned, on or before September 15, 1941, with the Iron and Steel Branch Office of Production Management, Washington, D. C.

Name of Warehouse _____ Location of Plant _____

Name and Address of Company owning Warehouse _____

a. List below, according to product classification, all deliveries of steel from stock during the first calendar quarter of 1941 (Jan. Feb. Mar.). Exclude shipments direct from producer to warehouse customers, and items "picked up" from other sources. Report all figures in net tons to the nearest tenth (.1).

	Deliveries From Owned Stocks	Deliveries From Consigned Stocks		Deliveries From Owned Stocks	Deliveries From Consigned Stocks
1. Ingots, Blooms, Billets, Slabs, Tube Rounds & Sheet & Tin Bars			14. Black Plate		
2. Structural Shapes and Piling			15. Tin & Terne Plate (Hot Rolled and Cold Reduced)		
3. Plates (Universal & Sheared)			16. Sheets and Strip, Hot Rolled		
4. Rails - Over 60 lbs.			17. Sheets and Strip, Cold Reduced		
5. Rails - All Other			18. Sheets & Strip, Galvanized		
6. Tie Plates & Track Accessories, Including Track Spikes			19. Sheets & Strip, All Other		
7. Hot Rolled Bars, Carbon, Incl. Hoops & Bands			20. Tool Steel Bars		
8. Hot Rolled Bars, Concrete Reinforcing			21. Wheels & Axles		
9. Hot Rolled Bars, Alloy			22. Forgings, Armor Plate & Ordnance		
10. Cold Finished Bars (Carbon & Alloy)			23. Forgings, All Other		
11. Pipe & Tubes			24. Steel Castings		
12. Wire Rods			25. Skelp		
13. Wire & Wire Products, Including Fence Posts			26. All Other		
			TOTAL DELIVERIES FIRST QUARTER		

b. Our Principal Sources of Supply of Steel are: (Use reverse side if necessary)

Name of Producer	Address of Plant

Date _____ Signature of Authorized Official _____ Title _____

Section 35(a) of the United States Criminal Code, 18 U.S.C.A. 80, makes it a criminal offense to make a false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

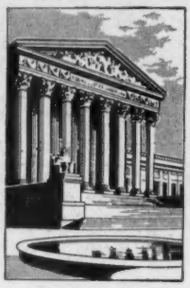
(For Use of the Division of Priorities Only)

QUOTA: Until further notice, the Director of Priorities hereby authorizes the warehouse named above to receive steel from his suppliers during each calendar quarter equal to _____ percent of the total tonnage of each product classification delivered from stock to customers during the period January 1 - March 31, 1941, except as follows: _____

For Iron and Steel Branch _____ Date _____ Director of Priorities _____

Windows of WASHINGTON

Rearranged OPM Industrial Branches assigned to Divisions of Production, Purchases, Civilian Supply and Materials . . . Allen asks more careful segregation of alloy steel scrap . . . New wage-hour act record-keeping regulations published . . . Changes in nickel-bearing scrap price schedule reported . . . Estimated production of ferrochromium in 1941 to be 160,000 tons . . . Foundry equipment makers get high priority rating



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ ASSIGNMENT of 28 Industrial Branches among the Divisions of Production, Purchases, Civilian Supply and Materials were reported last week by William S. Knudsen, OPM director general. Corresponding to the old commodity sections, the branches will comprise operating units under which the various industry committees will function.

Following an executive order issued Aug. 28 by President Roosevelt, placing the Civilian Supply Division in OPM, the latter has rearranged its industrial branches to handle industry's problems in accordance with that change. New line-up:

Division of Production: W. H. Harrison, director; includes aircraft, ordnance, tools, shipbuilding and construction branches. These will assume primary responsibility for dealing with problems in connection with manufacture of war implements and with defense construction projects.

Division of Purchases: Douglas C. MacKeachie, director; comprises the food supply, textiles, clothing and equippage, health supplies and civilian defense equipment, and containers branches. Primary responsibility for dealing with industries in which procurement of finished products is a major problem will rest with this group.

Division of Civilian Supply: Leon Henderson, director; consists of pulp and paper, printing and publishing, lumber and building materials, plumbing and heating, automotive and transportation equipment, electrical products and consumers' durable goods, industrial machinery, and rubber and rubber products branches. These will assume primary responsibility for dealing with industries serving predominantly civilian needs.

Division of Materials: W. L. Batt, director; includes aluminum and magnesium, chemical, iron and steel, power, nickel, tungsten, copper and zinc, manganese and chromium, tin and lead, mica and graphite, and miscellaneous materials branches. Primary responsibility for dealing with the manufacture and importation of industrial raw materials and industrial services essential to defense will rest upon this group.

No industrial branches are reported contemplated for the Priorities Division, Labor Division, or the Contract Distribution Division.

Seeks Better Scrap Segregation To Conserve Alloying Elements

R. C. Allen, deputy chief, Iron and Steel Branch of OPM, has sent questionnaires to fabricators and manufacturers estimated to be using about 90 per cent of current production of alloy steels, including stainless. Object is to explore possibilities for increasing supplies.

In many plants 20 to 40 per cent of alloy steel delivered by the producer is lost as scrap during conversion, it is believed. In some operations scrap may run 70 to 80 per cent.

Questionnaire asks extent to which alloy steel scrap is segregated by types and grades from carbon steel scrap. It also asks tonnage of each type of scrap produced during August and facilities available for shearing, crushing, baling, washing, briquetting, or otherwise preparing the scrap.

It is believed a large part of the alloy content of scrap now is being permanently lost because alloy scrap is mixed with other steel or metal scrap. If properly segregated, this alloy scrap would permit retaining a large tonnage of valuable alloying elements.

Extend Auto Junking Drive To Provide More Scrap for Defense

Campaign to increase junking of old automobiles to provide additional scrap iron and steel for defense production will be extended this week to Pennsylvania, New York, Maryland, Delaware, New Jersey and District of Columbia. Government officials will appeal to auto wreckers and scrap dealers to strip derelict cars in their yards of saleable parts and scrap the bodies and engine blocks immediately.

Campaign already under way in many parts of the country is designed to increase by at least 1,000,000 tons, and possibly several times that, the supply of iron and steel scrap.

Estimates of worn out cars in the country range from 3,000,000 to 7,000,000. An average of 1500 pounds of iron and steel scrap can be obtained from each.

Meetings to launch the campaign will be addressed by R. H. Ridgway, assistant to R. C. Allen, deputy chief of the Iron and Steel Branch of OPM, in charge of raw materials; Major E. T. Butler, of the Army and Navy Munitions Board; and Alex Miller, scrap consultant for the Iron and Steel Branch of OPM. Schedule of meetings follows:

Harrisburg, Pa., Hotel Penn, 1:30 p. m., Sept. 17, automobile wreckers and scrap dealers from Pennsylvania.

Albany, N. Y., Hotel Dewitt Clinton, 1:30 p. m., Sept. 18, automobile wreckers and scrap dealers from New York state.

Baltimore, Hotel Lord Baltimore, 1:30 p. m., Sept. 19, automobile wreckers and scrap dealers from Maryland, Delaware, New Jersey and the District of Columbia.

Fleming Reports Changes in Wage, Hour Act Regulations

Record-keeping regulations under which 350,000 employers keep payroll and other records for more than 15,500,000 workers were revised last week. Gen. Philip B.

AMERICAN MONORAIL

Increases Plant Capacity

Handling service furnished by American MonoRail interrelated cranes over the nation's largest aircraft assembly floor —plant of The Glenn L. Martin Company.

BEFORE YOU EXPAND *Explore* **AMERICAN MONORAIL**

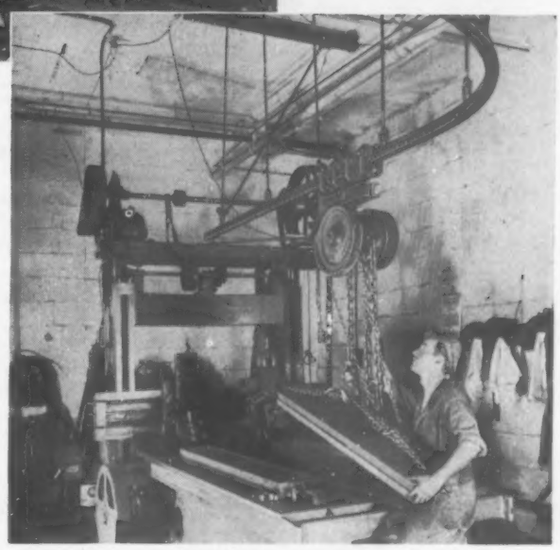
EVERY day more plants are adding capacity by putting their floor space to better use—by putting carrying jobs **overhead** with American MonoRail.

They find that materials and products are thus kept on scheduled routes—no congestion, no damage in transit.

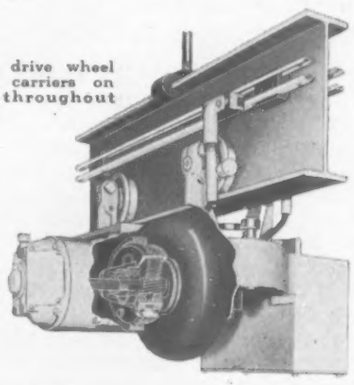
The men, too, relieved from lifting and carrying, give full time and skill to production and accomplish more.

Since standard parts are assembled into complete systems to meet the special requirements of the particular job, the cost of American MonoRail is surprisingly moderate. Operation and maintenance are a minimum. Supplied for manual, electric or automatic operation.

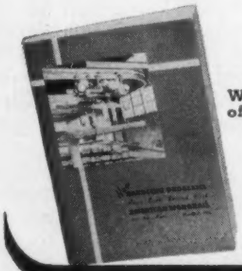
Let us arrange for an American MonoRail engineer to survey your requirements at no obligation.



Easy placing of heavy die blocks in planer with no damage to dies or machinery.



Rubber drive wheel propels carriers on cranes throughout system.



Write for copy of "Blue Book" showing hundreds of installations.

THE AMERICAN MONORAIL CO.

13102 ATHENS AVENUE **CLEVELAND, OHIO**

Fleming administrator of the Wage and Hour Division, Department of Labor, said the new regulations in several instances simplify present requirements. Others call for recording additional information.

"About one-fourth of the 48,000 inspections we made in the last fiscal year showed employers in technical violation of the act through failure to keep prescribed records," General Fleming said. "Our requirements in the matter of payroll records are very simple. No special order or form of records has been required or is required in the new regulations. However, we must have accurate information on the number of hours employes have worked. Employers paying on a salary, piece work, or other production basis have in many cases failed to realize this. An important part of the work of our men on inspections is education in the matter of keeping payroll records to satisfy the purposes of this law."

A new requirement of the regulations is that "each employer shall . . . preserve for at least two years from the last date of entry the originals or true copy of any and all customer orders or invoices received, incoming or outgoing shipping or delivery records, as well as all bills of lading, and all billings to customers other than 'cash' which the employer retains or makes in the course of his business or operations." Preservation of these records is required to enable wage and hour inspectors to determine if the act applies at any given time.

Explanatory bulletin issued with the new record-keeping regulations points out compliance with the regulations does not relieve the employer of record requirements of other federal agencies, such as those of the Bureau of Internal Revenue in the matter of social security and taxation.

Zone Labor Standards for Great Lakes Yards in Effect

Great Lakes shipbuilding companies and shipbuilding unions were notified last week that the zone labor standards, including basic pay rate of $1.12 an hour for standard skilled mechanics, is in effect, retroactive to June 2. Notification came from Sidney Hillman, OPM associate director general.

OPM has been apprised, according to Mr. Hillman's letter, of the approval of the standards by both employers and labor organizations affected. Great Lakes Metal Trades Council, AFL, formally ratified the standards; Industrial Union of Marine and Shipbuilding Workers, CIO, also approved the formal announcement of the standards' effectiveness.

Navy and Maritime Commission have likewise approved the Great Lakes standards as adopted. Similar standards are already effective in the other three shipbuilding regions of the nation.

France Resigns Position as OPACS Scrap Metals Expert

E. A. France Jr., scrap expert in the old Office of Price Administration and Civilian Supply since that agency's organization last January, has resigned to return to Standard Statistics where he had been Cleveland manager for five years. Before joining Standard Statistics, Mr. France was Pittsburgh editor for STEEL. Effective date of Mr. France's resignation has not been announced, nor has his successor been appointed.

Nickel-Bearing Scrap Price Schedule Amended

Changes in the nickel-bearing scrap materials price schedule, based on recommendations made at a recent meeting of dealers and consumers, were reported last week by Leon Henderson, price administrator. The amendments were designed to clarify and revise certain aspects of price schedule No. 8, which became effective June 2 and covered a wide variety of scrap and secondary materials containing nickel.

According to the revisions, a manufacturer or fabricator who produces nickel-bearing scrap is prohibited from qualifying as a converter, and thus is not entitled to the converters' premium established in the schedule. One price, $90 per gross ton, is fixed for the so-called 18 per cent chrome-8 per cent nickel type of stainless steel scrap.

Specific maximum price is established for stainless steel turnings and borings, which are said to have been selling at levels out of line in relation to existing schedule prices intended to apply to sheets, clippings and solids.

Maximum price of $10 per gross ton less than the applicable maximum price for carload lot shipments of chrome-nickel stainless steel scrap was established for less than carload lot shipments. The amendment provides a carload lot may be made up of any kind or grade of stainless steel scrap, including both chrome-nickel and straight chrome types.

In response to a request by OPM for uniformity in the present classification of straight chrome stainless steel scrap, OPA breaks down its listing into a class containing 12-14 per cent chrome, one containing 14-18 per cent, and another more than 18 per cent. Only the last is a new classification.

Ten dollar briquetting premium set forth in the present schedule will be allowed under the revisions for sales of stainless steel scrap in the form of any power pressed briquettes "suitable, without further preparation, for direct charging into an electric furnace."

Brokers will be allowed a flat premium of not more than $1 per gross ton on sales of nickel steel scrap.

1941 Ferrochromium Production To Total 160,000 Gross Tons

Ferrochromium is being supplied in the United States at a ratio more than three times that in 1937 and more than four times that of 1929, according to a report by the Advisory Committee on Metals and Minerals, National Research Council of the National Academy of Sciences. Estimate is that 1941 production of 70 per cent ferrochromium will total 160,000 gross tons, with 250,100,000 pounds of contained chromium.

Industry today, the committee reports, is consuming chromium at the current production rate, and would absorb more were it available. However, through judicious use of chromium, the steel industry has prevented serious shortage in any one spot, and as yet the situation is not considered highly critical.

Large stocks of metallurgical ferrochromium ores were available in January, 1940, and the rate of importation was such that a year later decrease in stocks was slight. Rate of import in the first four months this year was maintained at a high level. Even with a decrease in the rate of import the stocks are said to be sufficient that there would be appreciable time to solve problems that would arise from expected consumption increase.

Situation in actual smelting and refining is more critical, was at a rate of approximately 150,000 gross tons per year in January, 1941. Additional facilities under construction will increase capacity to 190,000 tons annually by the year's end, however, and will tend to ameliorate conditions substantially.

Transfer Relaying Rails to Steel Products Price Schedule

Railroad rail sold for relaying purposes has been taken out of the iron and steel scrap price schedule and transferred to the iron and steel products schedule, Leon Henderson, director, Office of Price Administration, reported last week.

Maximum prices for rail sold to be relaid for further transportation use, he declared, will be established by an amendment to the iron and steel products schedule.

Charge of $5 per ton above the

rerolling rail ceiling prices in the case of rail of relaying quality had been permitted in the scrap schedule. This provision was deleted and a paragraph defining "rail for rerolling" as any rail for rerolling purposes, whether or not such rail is of relaying quality, was substituted. Thus, prices of any rail sold to be used for rerolling must not exceed maximum prices for rerolling rail as set forth in the scrap schedule.

"It is not desirable," said Mr. Henderson, "that rail of relaying quality be used for rerolling purposes. Both rerolling rail and relaying rail are in great demand under the defense program."

Export Control Administration Opens Office in New Orleans

Opening of a fourth field office to assist exporters and foreign importers in dealing with problems associated with licensing exports in accordance with the economic defense program was reported last week by Brig. Gen. Russell L. Maxwell, export control administrator. New office is in New Orleans, through which passes a large volume of the trade with neighboring American republics.

Rapidly expanding requirements of the export control program have necessitated, since last January, the establishment of offices in New York, San Francisco and Los Angeles, plus that at New Orleans. Each is directed by an assistant administrator.

Functions of the field office staffs are to assist exporters and foreign importers in every way to obtain licenses required to maintain business under the export control regulations. Field offices also maintain constant contact with Department of Commerce and Customs Bureau representatives, local port authorities and others closely associated with export trade.

High Priority Ratings Assigned Makers of Foundry Equipment

Limited blanket order assigning high defense ratings of A-1-b and A-1-c to acquisition of six items was issued last week by Donald M. Nelson, director of priorities. Ruling was designed to assist manufacturers of foundry equipment and repair parts in obtaining certain scarce materials essential to their operations.

Items affected include castings and forgings; sheets, bars, shapes, plates and tubing (ferrous, nonferrous and nonmetallic); electrical equipment and accessories; mechanical equipment and accessories; cutting tools, including cemented carbides; and maintenance and shop supplies. Latter are restricted to items necessary for proper operation and maintenance of manufacturing equipment and facilities.

Rating A-1-b is assigned to deliveries of these materials to makers of molding and core machines; blast cleaning equipment; dust arrestors; sand preparing and handling equipment; and briquetting equipment.

Manufacturers producing melting furnaces, blowers, ladles, tumbling mills, shakeout equipment, and mold and core ovens are granted assistance of A-1-c rating in securing the listed materials.

These ratings, it was declared, may be extended as far as necessary to assure ultimate delivery of the required materials to the manufacturer. Firms receiving assistance of these priority ratings may fill only defense orders for the products thus expedited, or such other orders as the priorities director may direct them to meet.

Bill To Expedite Strategic Materials Acquisition Proposed

Bill introduced last week in the upper house by Senator Thomas, Utah, would empower the United States to obtain strategic and critical materials from foreign governments as offsets against any debts owed this country by such governments. The measure, S. Res. 161, also provides that heads of the Treasury, State and Commerce Departments should seek to augment supply of such materials in every way possible.

James S. Adams, Chief of OPM Automotive Branch, Resigns

Resignation of James S. Adams as chief of the automotive branch, OPM, was reported last week, although it was said he will remain on the OPM staff as consultant subject to call. Mr. Adams will return to his position as executive vice president, Colgate-Palmolive-Peet Co., Jersey City, N. J.

Allocations for September Pig Iron Production Completed

Entire September production of pig iron, expected to total approximately 4,500,000 tons, has been allocated to steel mills, iron foundries and other users, it was reported last week by the Iron and Steel branch, Office of Production Management.

Full priority control on pig iron was established Aug. 1 in an order issued by the Priorities Division of OPM. This required, among other factors, that stipulated quantities of pig iron be set aside each month for an emergency pool, and that schedules of pig iron shipments to customers be approved in advance by Priorities Division.

Allocations made in the past week included pig iron set aside for the pool.

Control Car for New Navy Patrol Airship

■ **Transportation of this control car to be installed on one of the Navy's new patrol airships under construction at Akron, O., imposed new problems upon movers of heavy equipment. Fabricated in the factory of Goodyear Aircraft Corp., Akron, the car was transported 10 miles to the assembly dock. Here the ship's envelope will be installed and the finished craft put through trial flights prior to delivery. Goodyear Aircraft is building six 404,000-cubic foot patrol airships for the Navy**

by TOCCO INDUCTION HARDENING

Here's TOCCO's speed-and-economy record in the plant of a milling machine manufacturer—vital to Defense—Read it again:

Production speed more than doubled!
Heat treating cost cut 90%!

The part—a saddle clamp eccentric of the Milwaukee milling machine. Formerly S. A. E. 4615 steel. Carburized, one end reheated in lead bath, quenched in brine. Required straightening. Production: 41 pieces per hour. With a TOCCO Jr. and S. A. E. 1045 steel, they have boosted output to 100 pieces per hour. Eliminated straightening. Reduced buffing. Cut cost more than 90%.

Why not get the SPEED and QUALITY results of TOCCO Induction Hardening for *your* products? Investigate the New TOCCO Utility Jr.—the low-priced 20 KW unit. Two models—for hardening and for heating small parts.

Photo and data courtesy of Kearney & Trecker Corp., Milwaukee, Wisconsin.

THE OHIO CRANKSHAFT COMPANY
CLEVELAND, OHIO

TOCCO
World's fastest, most accurate heat-treating process.

Mirrors of *MOTORDOM*

Defense equipment sandwiched into displays of new models in crowded week . . . Many problems involved in transferring labor from automotive to aircraft work. CIO angling for seniority protection . . . Ford planning new steel foundry with 45 tons per hour capacity, using cupola-converter-electric melting process. Output may go into centrifugally cast defense equipment parts

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ LAST week was a hectic one for visiting scribes from the nation's press who were kept in a constant whirl from defense plants to new model displays and back to defense plants. Briefly, the week went like this: Monday a showing of new De Soto models, Tuesday morning a trek through the new aircraft parts plant of Briggs Mfg. Co. (see p. 46); Tuesday afternoon a tour through the Hudson naval arsenal; Wednesday all day an inspection of General Motors defense production and 1942 models at the corporation's proving ground near Milford, Mich. Thursday a tour of Ford defense projects and a showing of new Ford, Mercury and Lincoln cars, and Friday a christening of 1942 Nash models, this in Chicago.

If there is one overall thought which can be considered transmitted to observers by this uninterrupted schedule of events, it is certainly that the motor car industry is fast moving into volume production of defense items, an achievement which can be appreciated only faintly by a mere inspection of finished parts. Back of them are long hours of tooling, personnel training and procurement problems, in spite of which the industry still hopes to be turning out automobiles that are better than ever.

There are many shoals ahead. For example, when W. P. Brown, Briggs president, was asked whether he thought his company would continue in the airplane business after the present emergency had passed, he said ruefully, "That's one I can't answer; I only wish I could see what we will be doing a year from today."

Labor remains a great question mark. Again take the case of Briggs as fairly typical. With peak employment in July of this year of 23,000 in all its nine plants, estimates indicate that curtailment of motor car production will throw 11,000 out of jobs. Of this 11,000, the most optimistic predictions are that only 3000 can be absorbed in aircraft parts fabrication, since it is a highly specialized technique, involving tolerances of thousandths instead of thirty-seconds or sixty-fourths, requiring a complete "untraining" of an automotive workman before retraining him in aircraft practice.

Already rumblings are heard from Briggs workmen of possible demands for company-wide seniority instead of merely seniority in a single plant. Indications are that the CIO locals involved would like to have such provisions made by verbal agreement but not incorporated in contracts with the company. Obviously when union members in automotive work see prospects of losing employment early next year and at the same time see hundreds of young fellows barely out of school moving into good jobs in aircraft work, they resent the possibility that when they are out of work there will be no room for them in the developing aircraft division.

Ordering Cupolas, Converters, Electric Furnaces for Foundry

Though not yet announced officially by the company, plans are well under way at Ford Motor Co. for some more important expansions. Heading the list is a new steel foundry to be located at one end of and at right angles to the present open-hearth plant, two stories in height and providing 350,000 square feet of floor space. Melting equipment will include four 96-inch hot blast cupolas, four side-blow 46-ton bessemer converters and six 12-ton electric furnaces, to be used together in a triplex melting process supplying steel at a rate of 30 tons an hour, with maximum output of 45 tons per hour.

It is believed possible that the move may be more for protection against raw material shortages and a pinch in blast furnace capacity than a direct expansion of metal output. At the moment the project appears to be awaiting priority rating but this is expected shortly and delivery of equipment is scheduled for six months. Piling is already being driven for the building.

The process essentially involves melting down scrap, briquetted borings, turnings, bundled sheets and other plant accumulations, plus some pig iron, in the cupolas, getting an iron somewhere around 3.25 per cent carbon. This will be transferred to bessemer converters which will take the carbon down to around 0.35, following which the metal will be transferred to the electrics for recarburizing, superheating and refining.

The electric furnace steel will be used for production of castings as yet not definitely identified in trade circles. One report is that production will be partly for use in tanks, another that parts for bomber undercarriages will be produced. It is believed that much of the production will be permanent mold castings, probably of the centrifugal type.

The foundry program seems to be the immediate portion of a long-range and still greater expansion which at least has progressed through the discussion stages. It involves a possible doubling of the size of the foundry just mentioned, integrating it with the open hearth division, with some 25-ton bottom-blow bessemers installed in the open-hearth division, as well as additional open-hearth furnaces. Present open-hearth steel is somewhat too high in phosphorus for good centrifugal castings, although it is possible that both desulphurizing and dephosphorizing ladle treat-

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ments can be worked out in the foundry, if necessary.

The triplex melting method is not a Ford development. It is now in use at one of the plants of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., where comparatively small steel castings are being poured on a continuous conveyorized basis. These castings include certain types of bombs as well as automotive parts, and production is reported to be at a high rate. Ford foundry technicians always have worked rather closely with C-W-C and the new Ford foundry likely will reflect much of the practice of the former organization.

Also up for discussion, with preliminary layouts already completed is a new aluminum foundry, estimated to cost something like $2,000,000. This project is still in the very tentative stage, and may not mature if Ford's experience with the magnesium foundry is any gage. Built far larger than total Ford requirements would call for, the magnesium foundry has yet to receive the orders for magnesium castings which government officials at one time indicated would be forthcoming.

There is the added possibility that plans for the third blast furnace at Ford may be dusted off and construction given the go-ahead. About four years ago this project was suspended but current defense demands may bring it to light once more.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,757
7 mos.	2,274,348	2,785,611	3,617,510
Aug.	103,343	89,866	.....
Sept.	192,679	284,583	.....
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

Week ended:	1941	1940†
Aug. 16	46,750	20,475
Aug. 23	45,525	23,732
Aug. 30	39,965	27,645
Sept. 6	32,940	39,665
Sept. 13	53,165	66,615

†Comparable week.

Optional Semiautomatic Drive Is Announced

Feature of 1942 Studebaker models is a so-called Turbo-matic drive which comprises fluid coupling with an automatic clutch and overdrive transmission. It is available as extra-cost equipment. A selector lever on the steering column has four positions—reverse, low, traffic range and cruising range. Overdrive is used in both traffic and cruising ranges and operates at speeds above 15 miles per hour. It is actuated by releasing pressure on the accelerator pedal momentarily. Automatic clutch operates through engine manifold vacuum.

Three controls affect clutch operation, namely: A governor on the transmission which disengages the clutch below speeds of 6 m.p.h.; a control in the throttle mechanism which can "over-rule" the governor and engage the clutch; and a control on the shift mechanism which disengages the clutch at the start of the shift and permits re-engagement when the shift is completed. The clutch will not disengage unless the throttle is closed.

Studebaker pistons are changed to iron alloy, with surfaces protected by Lubrizing. They are lighter and more uniform in structure and section than former types of iron pistons with internal diameter held within 0.004-inch.

Stylewise, the Studebakers comprise the usual three series, Champion, President and Commander.

August Sales Toboggan

Analysis of August sales of General Motors shows output of U. S. and Canadian plants going to dealers and export totaling 29,268, compared with 24,019 a year ago. Sales to dealers in the U. S. totaled 19,690, against 21,154 in 1940, while sales to consumers in the U. S. were 84,969, against 100,782 a year ago. Thus dealer inventories in the U. S. were reduced by 65,270.

Total deliveries to dealers for the first eight months of the year were 1,552,743, while sales to consumers reached 1,663,566, suggesting that the carryover of 1941 models into the new season is virtually nil.

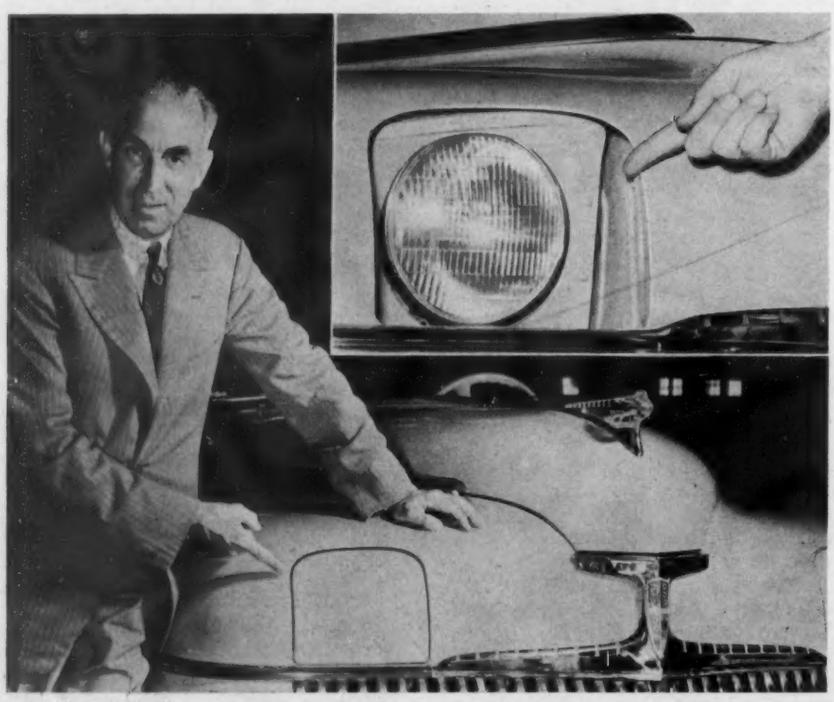
No Rust on Guns Is Answer

Specifications for the loader mechanism of a foreign-designed gun were being examined here recently by automobile production experts and ordnance officials. Stainless steel was called for and the ordnance people were told of the difficulty of obtaining stainless in quantity and the difficulty in machining it as compared with plain carbon steel.

"But," said one ordnance official, "other steels will rust."

"True," the engineers replied, "but since when have soldiers allowed guns to rust?"

Conceding defeat, the ordnance experts ordered tests of alternate steels, one of which was accepted.



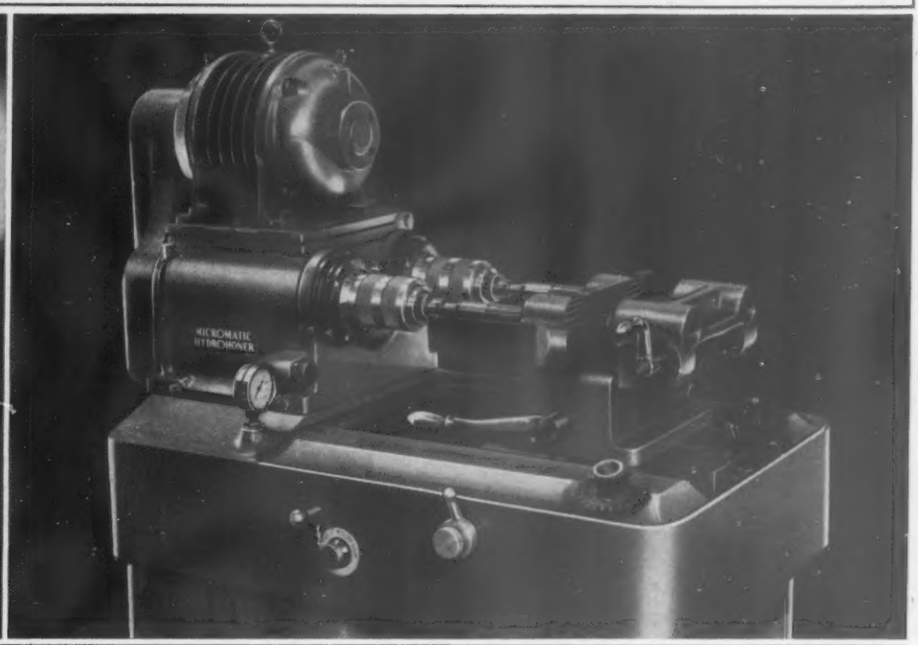
■ Standard on all forthcoming 1942 De Soto models are these "airfoil" headlights concealed during the daytime by flush-fitting sliding panels which leave front fender lines smooth and unbroken and protect the recessed lights from mud, dust and flying stones. The panels operate together and are controlled by a lever under the dash of the car, which also turns on the lights as the panels are opened. L. G. Peed, vice president, De Soto Division of Chrysler Corp., here points to the closed panel, insert showing appearance of the headlight when open

MICROMATIC HYDROHONER *with* AUTOMATIC MICROSIZE

Generates

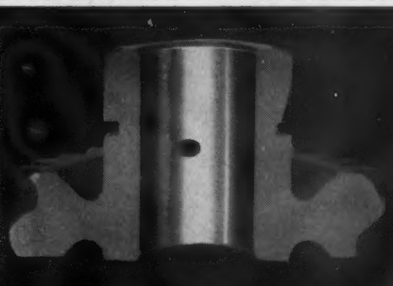
Uniform Size within .0002″ to .0005″
Bore Accuracy within .0001″ to .0002″
Removes Sufficient Stock for Above Results

Automatic Second Speed Gear



In forged steel second speed gear bores 1.062″ I.D. x 1.886″ long, and Rockwell C 49-54 hardness; total error up to .001″ is corrected by removing .001″ to .0015″ stock following grinding, generating uniform size within .0005″, geometric accuracy within .0001″ to .0002″ and surface smoothness accuracy within 1.8 to 2.5 microinches root-mean-square—all at the rate of 240 bores per hour on this two spindle machine.

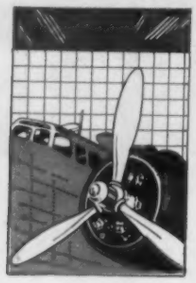
Generates any desired type and degree of surface smoothness



Circumferential (root-mean-square)—1.8 to 2.5 millionths of an inch

MICROMATIC HONE CORPORATION
1345 E. Milwaukee Ave. Detroit, Michigan

WING TIPS



Briggs Mfg. Co. reaches volume production of aircraft parts . . . Ford moving fast in preparing for assembly of Consolidated bombers, scheduling first ten ships for old plant where tri-motors once were built. Subcontracting is widespread on bomber program. . . . Pressure for production prevents simplification of airplane construction, despite its acknowledged advantages

■ FIVE MILLION dollar aircraft parts plant of Briggs Mfg. Co., Detroit, which grew up from a circus grounds in the space of 14 months, is now in volume production on $40,000,000 worth of wing flaps, complete wings, bomb bay doors, gas tank doors, and other sub-assemblies involving a total of 10,000 separate parts. Last week representatives of the press were conducted on a tour of the plant where they saw 2300 trained workmen busy in about one-third of the available 675,000 square feet of floor space. Eventual employment will reach a peak of perhaps 7500 next June as production is stepped up.

Briggs is the largest independent automobile body builder in the business and has adapted many of its techniques to the fabrication and assembly of aluminum alloy aircraft parts. W. P. Brown, president, in summarizing activity, laid special emphasis on the use of Briggs-developed spot welding methods, as well as the adaptation of automotive-type mechanical and hydraulic presses with conventional alloy iron dies to the forming of aluminum.

Seventy different types of ducts are being produced for Boeing B-17-E flying fortresses, production now being at the rate of 210 a day, which eventually will be stepped up to 560 per day. These ducts are extremely complicated in shape and spot welding is used extensively in their assembly. Formerly it was necessary to place rivets every ⅜-inch along seams. Now rivets are placed every 4 inches and spot

From Auto Parts to Plane Parts—in 14 Months

■ WITH $40,000,000 worth of aircraft parts orders on the books, Briggs Mfg. Co., Detroit, last week announced it had reached volume production on many of these items, including wing and tail sections for Vought-Sikorsky navy planes; bomb doors, duct sections, wing flaps and gas tank doors for Boeing B-17-E Flying Fortresses. Starting from scratch in July, 1940, Briggs now has 675,000 square feet of building space for parts manufacture, much equipment installed and about 2300 trained men at work, against eventual employment of 6000. On these pages are a number of photos of fabricating operations, which feature extensive use of spot welding as a timesaver and laborsaver in fabricating, as well as adaptation of standard types of automotive dies and presses for forming operations.

Fig. 1—Riveting flap assemblies for Boeing flying fortresses. Note long mandrel with pneumatically controlled tool for backing up rivets in main tube assembly

Fig. 2—Some Boeing flying fortress gas tank doors, with more than 4970 rivets and 100 major parts

Fig. 3—Women show their skill in stitching fabric on trailing edges and touching up Vought-Sikorsky "fighter" wings

welds are make about every ½-inch in the intervening space.

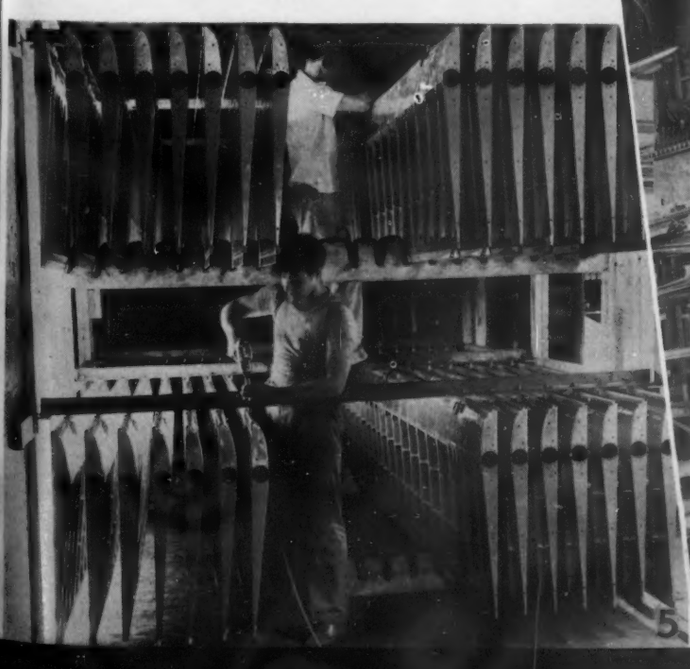
As an example of the savings in time and cost possible through spot welding, Mr. Brown pointed out that the Sikorsky wing made by Briggs, and specially designed for welded assembly, comprises 3600 parts, into which go 2000 rivets and 11,000 spot welds. In contrast, the wing for the Douglas bomber, which Briggs is tooling up to produce, comprises 4500 parts with a total of 28,000 rivets and no welds. By drilling and riveting methods it is possible to complete about 30 rivets in two hours. With welding it is easily possible to produce 24-30 spots a minute.

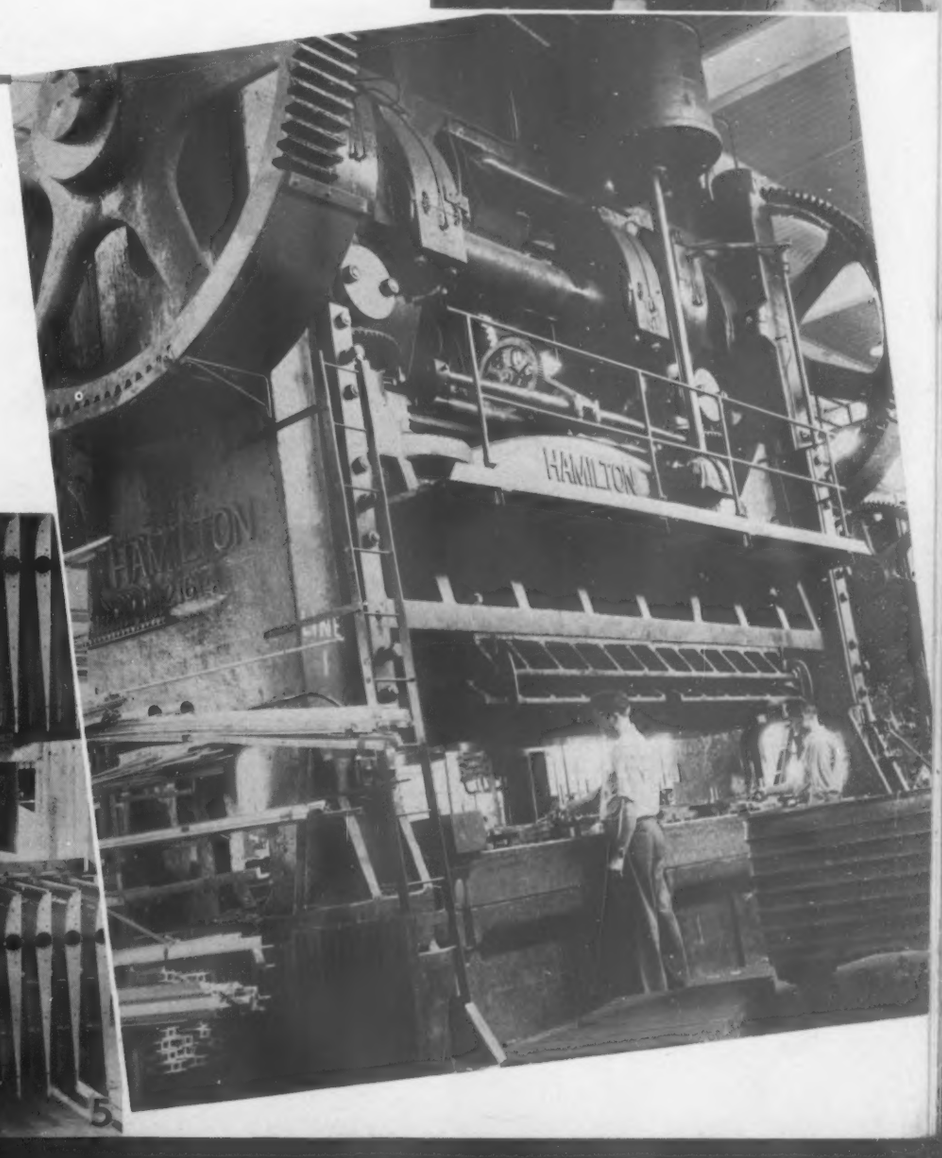
Of course, in spot welding aluminum, it is necessary to dress welding tips frequently, and test coupons must be welded up for pull tests at regular intervals, thus slowing the welding process somewhat. But Briggs' experience with welding aluminum alloy has been

Fig. 4—Craftsman is spot welding an aluminum alloy leading edge section for a Vought-Sikorsky wing

Fig. 5—Loading flaps for Boeing flying fortresses in special freight car racks after manufacture

Fig. 6—This 1600-ton giant and other typical automobile production mechanical presses are being used by Briggs to produce more than 8000 different aircraft stampings of aluminum alloy sheet





entirely favorable, with welded joints showing about twice the strength of those riveted. Engineers emphasize, however, that to use welding, the plane part must be designed for the method, and furthermore many joints are inaccessible to any types of welding machines now used, thus must continue to be riveted. Briggs welding machines were designed by H. T. Platz, Briggs engineer, use Sciacky control panels and Westinghouse rectifier tube.

Several of the large mechanical presses formerly operated in the Briggs pressed steel division on autobody work have been moved to the aircraft parts plant for working aluminum. They will be supplemented with batteries of hydraulic presses, but it is the present plan to use no drop hammers whatsoever. Aluminum behaves differently in press dies than does steel, but by properly regulating speeds, pressures and the "dwell" of the dies, no difficulties have been encountered in aluminum drawing operations on this type of equipment.

One of the most difficult problems in building up this large aircraft parts plant has been the matter of training personnel. This was started by sending 42 foremen from the body plant through a defense training school in Detroit, then using them as a nucleus for training more men. However, it was found costly, both in time and rejected work, to attempt to train men on the job, so now a training school has been organized, staffed by shop men and graduate engineers in equal numbers. Recruits are trained in specific job elements in 60 days and then are moved into the plant and upgraded to more complicated work as fast as possible.

It was found that in general the morale and attitude of these workmen was decidedly not attuned to the circumstances of the present emergency, so $35,000 has been budgeted for pictures and other means of morale-building, both from the standpoint of organizational efficiency and reducing material waste.

Ford To Follow Consolidated's Methods in Building Bombers

In its day, the Ford trimotor transport plane was considerably ahead of anything else then flying the skyways. Although it lumbered along at about 90 miles an hour, the ship was exceptionally well built, was easy to handle and provided a high degree of safety. Many of these old transports are still in service in out of the way places like Central and South America, but the plant at the Ford airport in Detroit in which they were produced for years has been gathering dust. Perhaps gathering dust is not the right phrase, since no dust is allowed to accumulate on any part of the Ford industrial system, but at least plane building ceased, presumably because of Mr. Ford's sudden decision to terminate this phase of his operations after one of his test pilots was killed in a plane crash.

But the plant is coming to life again. Jigs, fixtures, dies and related equipment are being moved into position and shortly ten Consolidated B-24D bombers will start to take shape, giving production crews valuable experience in advance of the opening of the huge Ford bomber plant at Ypsilanti, Mich. When the ten assemblies are completed at the old plant, a portion of the equipment will be moved into the new building, and the old trimotor plant will again lapse into calmness except for occasional engineering checks of parts produced in the new plant.

Jigs and dies now being moved into the plant were brought direct from Consolidated's plant at San Diego, where a contingent of Ford engineers has been busy for several months familiarizing themselves with production practice.

When Ford first decided to build complete bombers, the company's engineers believed they could revamp the entire job and adapt it better to mass production methods as they are known to the automotive industry. C. E. Sorenson, Ford production chief, in particular was convinced that some sweeping changes could be made in assembly methods and in early conferences between Air Corps engineers, Consolidated technicians and Ford, some startling proposals were advanced. One suggestion coming from Ford was that the fuselage be assembled vertically, moving it along a line between three levels of work platforms on either side. While the idea probably was good and is typical of "automotive philosophy" applied to airplane manufacture, it would have meant completely new tooling for the entire plane. This was held to be too time-consuming, so the plan was abandoned.

In any event, while Ford will follow Consolidated's practice pretty closely in the new Willow Run plant, you can be sure there will be many innovations in fabricating and assembly worked out by Ford engineers.

Already Ford has started to subcontract a large portion of the job, and is believed to be further along on this phase than either General Motors or Chrysler, which companies are supplying assemblies for the North American B-25 and Martin B-26 bombers as a part of the Knudsen plan of auto-aircraft cooperation. Recent award by Ford was contract for rear gun turrets, amounting to $11,500,000 and placed with Motor Products Corp. in Detroit, deliveries starting early next year.

Chrysler will bring some 500 subcontractors into the picture in assembling center and nose sections for the Martin bomber, and 11 of its own plants will contribute as well. In just the two sections of the plane which Chrysler will supply there are 11,500 separate pieces, held together by 54,000 rivets, plus some welding. The nose and center sections together weigh 4800 pounds and are 33 feet in length. Compare these figures with a typical sedan auto body, which weighs 976 pounds, is 11 feet 5 inches long and comprises only 2500 separate parts.

The obvious conclusion is that a vast amount of simplification might be applied to building of these bombers. There is no argument on this contention either from plane manufacturers or from air corps engineers. But simplification takes time and the bombers are needed in a hurry. Plane builders are not guilty of overcomplicating their designs. After all, they have been building these ships only a few years and designs are constantly changing. Simplification of construction is the outgrowth of mass production and design standardization.

Triples Production Rate On Pursuit Ships

Republic Aviation completed deliveries of P-43 pursuit planes on its second Air Corps' contract in 104 days. Contract total was $3,082,160 and although exact production figures are a military secret, a reasonable figure for this type of plane might be something like $30,000, so the contract would figure to something over 100 planes and the production rate thus one a day. Production is continuing on later contracts.

On a dollar-volume basis, Republic increased its deliveries by 305 per cent in July and August, compared with the same two months last year. The company has started construction of a $300,000 two-story administration building at its Farmingdale, N. Y., headquarters. Airplane builders are steadily whittling down the time required between the first design of a new plane on paper and the start of production. Three years was once considered about average, but this is now down to about one year, which is comparable to if not an improvement on automotive practice.

R. L. Burla, assistant to the president of North American Aviation, indicated recently that less than 15 months was required to get the company's new Mustang pursuit

(*Please turn to Page* 188)

Federal Expenditures for Defense Totaled $1,172,000,000 in August

■ FEDERAL government expenditures for national defense in August totaled $1,172,000,000, according to a preliminary computation by the Bureau of Research and Statistics, Office of Production Management. New high in monthly defense expenditures, this was an increase of 9.5 per cent over $1,070,000,000 in July.

August increment brings total defense expenditures since July 1, 1940, when accelerated spending for rearmament began, to $9,282,000,000.

Defense fiscal program, including appropriations, contract authorizations and Reconstruction Finance Corp. commitments for defense as of Aug. 31, aggregated $56,357,000,000. British government orders for war materials placed in the United States increases the total to $60,016,000,000.

Disbursements by months from July, 1940, through August, 1941, on a checks issued basis:

1940	Millions of Dollars	Percentage Change from Previous Month
July	176.9	.....
August	235.3	+33.0
September	269.5	+14.5
October	332.1	+23.2
November	405.0	+22.0
December	489.0	+20.7
1941		
January	737.2	+50.8
February	721.8	— 2.1
March	854.6	+18.4
April	918.8	+ 7.5
May	910.8	— 0.9
June	*989.0	+ 8.6
July	†1,070.0	+ 8.2
August	†1,172.0	+ 9.5
Fourteen months	†9,282.0	

*Revised; †preliminary.

Defense awards placed last week by the War Department totaled $402,743,569. Aircraft awards comprised more than 85 per cent of the aggregate placed in that period. Contracts reported in the week included:

Austin Co., Cleveland, $1,537,936 for warehouse, loading platform, dock, railroad, paving and utilities at port of embarkation, Seattle.

Boeing Aircraft Co., Seattle, airplanes and spare parts, $337,447,058.

Douglas Aircraft Co. Inc., Santa Monica, Calif., airplanes and spare parts $9,709,616.85.

Briggs, R. W., & Co., and Hill & Combs, San Antonio, Tex., $4,090,618 for advanced single engine flying school at Mission, Tex. Contract includes 130 miscellaneous cantonment type buildings, railroad spur, gasoline and oil storage facilities, aprons, taxi strips, runways, fencing and all utilities.

Kellogg, M. W., Co., New York, $6,557,086 subcontract for design, construction and equipment of an anhydrous ammonia plant at Sterlington, La., to be known as the Dixie Ordnance Works. Commercial Solvents Corp., New York, will operate the plant.

Ordnance Department Awards

Allegheny Ludlum Steel Corp., Brackenridge, Pa., gages, $31,175.

Allis-Chalmers Mfg. Co., Milwaukee, parts for tractor, $2255.44.

All Tool Co., Hillside, N. J., cutters, strippers, spring strippers, tweezers, $1640.

Aluminum Industries Inc., Cincinnati, shot, $3,960,000.

American Brass Co., Waterbury, Conn., hard seamless bands, $52,621.69.

American Locomotive Co., Railway Steel Spring Division, New York, forgings, $3282.25.

American Mfg. Co. of Texas, Ft. Worth, Tex., shells, $455,000.

American Screw Co., Providence, R. I., screws, $2440.

American Twist Drill Co., Detroit, tools, $2724.88.

American Type Founders Sales Corp., American Munitions Division, Elizabeth, N. J., forgings, $1703.85.

Ames, B. C., Co., Waltham, Mass., gages, $8370.

Armour Research Foundation, Chicago, complete engine and analytical tests, $24,000.

Armstrong-Blum Mfg. Co., Chicago, hacksawing machines, $4781.06.

Armstrong Bros. Tool Co., Chicago, hatchet drills, $2818.40.

Armstrong, G. R., Mfrs. Supplies Inc., New Britain, Conn., spare parts for carriages, $4125.54.

Artistic Bronze Tablet Co. Inc., Brooklyn, N. Y., sheet brass, $1444.70.

Associated Attleboro Mfrs. Inc., Attleboro, Mass., assembly, $19,752.60.

Associated Spring Corp., Dunbar Bros. Division, Bristol, Conn., spring plungers, $1761.72; Wallace Barnes Co. Division, Bristol, Conn., extractor springs, $2394.

Atlas Press Co., Kalamazoo, Mich., spare parts for lathes, $5041.

Ayer, F. H., Mfg. Co., Chicago Heights, Ill., drilling machines, $7317.

Baird Machine Co., Bridgeport, Conn., metal forming and milling machines, $37,418.62.

Baldwin Locomotive Works, Standard Steel Works Division, Philadelphia, forgings, $16,160.

Bakewell Mfg. Co., Los Angeles, tapping machine with equipment, $1547.50.

Barber-Colman Co., Rockford, Ill., sharpening machine with equipment, cutters, $10,135.02.

Barium Stainless Steel Corp., Canton, O., metallic links, $4,011,400.

Barwood & Co., Philadelphia, gages, $11,086.

Bay State Tool & Machine Co., Springfield, Mass., gun parts, $66,925.13.

Bearings Co. of America, Lancaster, Pa., ball bearings, $2219.20.

Behr-Manning Corp., Troy, N. Y., gun parts, $11,847.

Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., parts for tanks, $28,223.25; Scintilla Magneto Division, Sidney, N. Y., parts for tanks, $12,753.40.

Berkeley Equipment Co., Corry, Pa., machines, $7060.

Bethlehem Steel Co., Bethlehem, Pa., steel, $15,461.97.

Bliss, E. W., Co., Chicago, presses, $3576.

Bliss & Laughlin Inc., Buffalo, N. Y., steel, $3640.50.

Boston Gear Works Inc., Springfield, Mass., gear pumps, $1372.50.

Botwinik Bros. Inc., Hamden, Conn., grinding machines, $3400.

Boumans Engineering Co., North Arling-

Lake Erie Yard Launches Submarine Net Tender

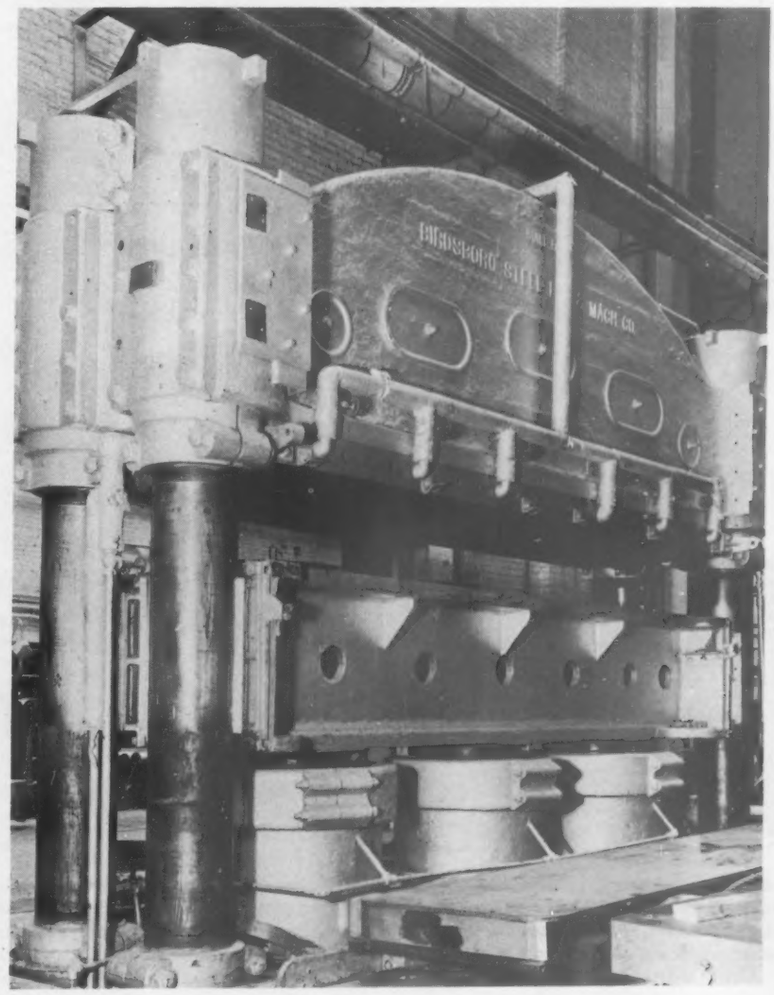
■ Against the background of a mountainous pile of limestone accumulated to ensure ample supplies for future blast furnace operations, the LOCUST, first submarine net tender built in a Great Lakes shipyard is shown here after its launching recently by the American Shipbuilding Co., Cleveland. Many Lakes yards are engaged in building net tenders, minesweepers, minelayers and other small craft for the national defense program. NEA photo

ton, N. J., delay firing pins, $3100
Bower Roller Bearing Co., Detroit, cups and cones, $5518.82.
Bradford Machine Tool Co., Cincinnati, lathes, $140,010.
Bridesburg Engineering Co., Philadelphia, tools, wrenches, screwdrivers, pins, $21,346.
Bridgeport Brass Co., Bridgeport, Conn., brass discs, $2100.
Briggs & Stratton Corp., Milwaukee, metal parts for bomb fuzes, $1400.
Bristol & Martin Co., New York, gages, $2825.
Brown & Sharpe Mfg. Co., Providence, R. I., gages, $4461.01.
Buda Co., Harvey, Ill., parts for tanks, $10,587.50.
Budd Wheel Co., Detroit, disc and rim assemblies, $3981.14.
Camden Forge Co., Camden, N. J., steel, $20,476.20.
Carnegie-Illinois Steel Corp., Pittsburgh, steel, $3582.30.
Carpenter & Paterson Co. Inc., Medford, Mass., bronze castings, $2915.82.
Carroll-McCreary Co. Inc., Brooklyn, N. Y., black steel, $1241.97.
Chandler, Ernest, New York, tool rolls, $3448.60.
Christiansen, C. B., Newark, N. J., fixtures, cutters, belts, ball bearings, pin brakes, $2310.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, drilling machines, $2253.
Cincinnati Milling Machine Co., Cincinnati, milling machines, $13,600.
Cincinnati Planer Co., Cincinnati, bevel gears, $1214.25.
Clark Grave Vault Co., Columbus, O., shells, $889,100.
Cleveland Hardware & Forging Co., Cleveland, forgings, $12,896.50.
Clifford-Jacobs Forging Co., Champaign, Ill., drop forgings, $24,112.
Columbus Forge & Iron Co., Columbus, O., forgings, $9400.
Continental Motors Corp., Muskegon, Mich., parts for tanks, $2,345,661.11.
Continental Roll & Steel Foundry Co., East Chicago, Ind., set-castings, $2222.
Copperweld Steel Co., Warren, O., steel, $22,876.
Covel Mfg. Co., Benton Harbor, Mich., twist drill grinders and grinding wheels, $10,986.75.
Cowles Tool Co., Cleveland, drill and counterbores, $3366.
Crawford Mfg. Co. Inc., Kansas City, Mo., miscellaneous equipment, $25,984.75.
Crocker Wheeler Electrical Mfg. Co., Ampere, N. J., bomb bodies, $2,096,250.
Crucible Steel Co., of America, New York, steel rods, forgings and steel, $39,527.01.
Cuyahoga Spring Co., Cleveland, clip ejectors, $6220.
Daizen Tool & Mfg. Co., Detroit, ground thread taps, $49,967.
Dana Tool-D Nast Machinery Co., Detroit, twist drills, $1627.10.
Daniels, C. R., Inc., New York, metallic belt link bags, $21,038.08.
Detroit Tap & Tool Co., Detroit, gages, $15,215.57.
Duplex Mfg. Corp., Sherman, N. Y., steel chests, $14,002.55.
Duro Metal Products Co., Chicago, wrenches, $1200.
Eastern Machine Screw Co., New Haven, Conn., extruded brass rods, $2848.
Edgcomb Steel Co., Philadelphia, forgings for cartridge cases, $1080.
Edgewater Steel Co., Pittsburgh, forgings for rings, $1101.10.
Efficient Tool & Die Co., Cleveland, jig fixtures, $2840.
Equipment Co., Detroit, cutters, $4517.50.
Ever-Tite Mfg. Co., Davenport, Iowa, parts for tanks, $82,376.25.
Federal Tool Corp., Chicago, gages, $9752.
Fellows Gear Shaper Co., Springfield, Vt., gear shaper, $7418.20.
Firth-Sterling Steel Co., Philadelphia, cases and body dies, $2150.
Fisher, Charles, Spring Co., Brooklyn, N. Y., components for guns, springs, $105,596.57.
Fort Dearborn Mfg. Co., Sterling, Ill., parts for tanks, $1280.50.
Fox Munitions Corp., Philadelphia, gages, $4190.
Frasse, Peter A., & Co. Inc., New York, pipe elbows, flanges, and tees, $2837.43.
French, F. A., Latrobe, Pa., percussion primers, $15,900.
Gallmeyer & Livingston Co., Grand Rapids, Mich., drill grinder, $544.50.
General Electric Co., Schenectady, N. Y., motor-generator with controls and switchgear, $13,355.74.
General Electric Supply Corp., Springfield, Mass., electrical equipment, $1118.80.
General Machinery Corp., Niles Tool Works Division, Hamilton, O., equipment for machine tools, $54,801; Boston Division, machine attachments, collets, holders, and arbors, $2385.
General Motors Corp., Delco Brake Division, Dayton, O., automatic screw machines, $62,400.
General Motors Sales Corp., New Departure Division, Bristol, Conn., angular ball bearings, $1735.45.
General Printing Ink Corp., Fuchs & Lang Mfg. Co., Philadelphia, grained zinc plates, $1300.
General Railway Signal Co., Rochester, N. Y., shells, $4,417,500.
Geometric Tool Co., New Haven, Conn., die chasers and heads, $1230.86.
Gilbert & Barker Mfg. Co., West Springfield, Mass., gun parts, $40,809.36.
Goddard & Goddard Co. Inc., Detroit, side mills, $1792.
Gorton, George, Machine Co., Racine, Wis., duplicators and milling machines, $12,813.32.
Gould & Eberhardt, Irvington, N. J., hobbing machine, $7999.
Grant Oil Tool Co., Los Angeles, smoke shell projectors, $462,884.78.
Greenfield Tap & Die Corp., Greenfield, Mass., gages, $43,588.82.
Hadley Special Tool Co. Inc., Boston, gun parts, $36,366.
Hampden Electric Supply Co., Springfield, Mass., steel conduit, $2235.
Handy Governor Co., Ann Arbor, Mich., parts for tanks, $8002.14.
Harrington & King Perforating Co., Chicago, tubes for tanks, $1086.30.
Hayes, Charles E., Co., Springfield, Mass., single conductor cable, $1291.50.
Hendey Machine Co., Torrington, Conn., machine tools, $69,330.
Horat, Joseph, Lafayette, Ind., lead hammers, $2479.14.
Horton, E., & Son Co., Windsor Locks, Conn., mill jaws, $1159.08.
Hunt, A. E., Steel Co., Boston, steel, $1222.
Illinois Tool Works, Chicago, end milling cutters, $2469.60.
Ingersoll Milling Machine Co., Rockford, Ill., grinders, $1443.
International Engineering Works, Framingham, Mass., steel discs, $1800.
International Machine Tool Corp., Indianapolis, equipment for turret lathes, $432,008.50.
Johnson Claflin Corp., Marlboro, Mass., gages, $11,115.40.
Jones & Lamson Machine Co., Springfield, Vt., thread chasers, $1180.80.
Jones & Laughlin Steel Corp., Pittsburgh, shells, $5,126,500.
Joslyn Mfg. & Supply Co., Chicago, shot, $13,974.
Kearney & Trecker Corp., Milwaukee, milling machines, $40,868.90.
Keenan Supply Co. Inc., Philadelphia, air vent fixtures, and equipment, $1307.
Kent Aircraft & Machine Tool Co., Camden, N. J., gages, $11,489.65.
Kidde, Walter, & Co., New York, fire extinguishers, $3948.
King Machine Tool Co., Cincinnati, vertical boring mill, $31,204.
Kobe Inc., Hunt[illegible]gton Park, Calif., gages, $2304.30.
Landis, A. B., Sons Inc., Wyndmoor, Pa., punches, posts, segments, $6320.50.
Landis Tool Co., Waynesboro, Pa., grinding machines, $45,346.
Larkin Packer Co. Inc., Davis Boring Tool Division, St. Louis, small cutting tools, $8115.
La Salle Steel Co., Hammond, Ind., steel, $7009.90.
Latrobe Electric Steel Co., Latrobe, Pa., steel, $7094.98.
LeBlond Machine Tool Co., Cincinnati, drilling machines, $2,117,501.
Lewis-Shepard Sales Corp., Watertown, Mass., lift trucks and equipment, $1230.
Liberty Tool & Die Corp., Rochester, N. Y., fixtures, $2042.
Liberty Tool & Gage Works Inc., Providence, R. I., gages, $16,408.
Lincoln Park Tool & Gage Co., Lincoln Park, Mich., gages, $28,305.44.
Lindsley Mfg. Co. Inc., Milford, Conn., gages, $13,440.
Link Belt Co., Indianapolis, shot, $4,499,850.
Linley Bros. Co., Bridgeport, Conn., machine tools, $8301.50.
Lite Mfg. Co., Philadelphia, assemblies, $167,000.
Logansport Machine Co. Inc., Logansport, Ind., chucks, $4010.30.
Magnaflux Corp., Chicago, inspection machines, $2943.
McDonough Mfg. Co., Eau Claire, Wis., grinders, $1420.
McEvoy Co., Houston, Tex., machine gun tripod mounts, $154,561.68.
Mechanical Laboratories Inc., Pittsburgh, gages, $1280.75.
Merco Co., Los Angeles, gages, $20,930.
Mercury Mfg. Co., Chicago, truck, $4091.
Minster Machine Co., Minster, O., presses, $3536.
Modern Tool & Die Co., Philadelphia, gages, $4684.50.
Monarch Machine Tool Co., Sidney, O., lathes, $70,298.27.
Multi-Products Tool Co., Newark, N. J., bases, punch guides, anvils, punches and locating discs, $3525.
Murray Co., Atlanta, Ga., shells, $162,000.
National Enameling & Stamping Co., Granite City, Ill., cartridge cases, $1,294,650.
National Lock Washer Co., Newark, N. J., rough forgings, $3346.50.
N. E. Gas Products Inc., Charlestown, Mass., oxygen gas tanks, $4950.
Nelpin Mfg. Co., Long Island City, N. Y., gages, $2925.
New York Thread Grinding Corp., New York, gages, $18,618.
Nice Ball Bearing Co., Philadelphia, thrust bearings, $4330.15.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., lathes, reamers, gages, $15,864.35.
Ny-List Tool & Mfg. Co., Rockford, Ill., grinding machines, $19,200.
Offerman, L., Co., New York, gages, $4900.
Otis Elevator Co., Buffalo, steel castings, $1300.93.
Otis Steel Co., Cleveland, steel, $20,153.40.
Peck Electric Supply Co., Troy, N. Y., steel conduit, $1082.27.
Penn Instrument Co., Philadelphia, gages, $2880.
Pittsburgh Steel Foundry Co., Glassport, Pa., steel castings, $11,566.80.
Precise Tool & Mfg. Co., Farmington, Mich., gages, $8940.
Precision Mfg. Co., New York, gages, $33,799.
Poldi Steel Co. Inc., Chicago, tool bits, $3605.88.
Pope Trading Corp., New York, pig tin, $11,098.
Quality Tool & Die Co., Indianapolis, gages, $7470.
Racine Tool & Machine Co., Racine, Wis., hydraulic sawing machines, $2680.
Rahaim Machine & Tool Co., Gardner, Mass., gages, $2438.
Read Machinery Co. Inc., York, Pa., parts for mortars, $1143.50.
Regina Corp., Rahway, N. J., fuzes, $548,895.
Rehnberg-Jacobson Mfg. Co. Inc., Rock-

ford, Ill., needle bearing machine, $2083.50.
Reliable Tool Co., Irvington, N. J., cutters, strippers, spring strippers, and shank punches, $1990.
Reliance Steel Casting Co., Pittsburgh, steel castings, $4264.
Remington Arms Co. Inc., Bridgeport, Conn., primers, $1500.
Republic Steel Corp., Cleveland, steel, barrel blanks, $20,084.46.
Revere Copper & Brass Inc., Baltimore, sheet copper, $1271.74.
Rolock Inc., Southport, Conn., pickling baskets for fuzes and cartridge cases, $22,680.
Ryerson, Joseph T., & Son Inc., Chicago, steel, $1017.32.
Saginaw Stamping & Tool Co., Saginaw, Mich., bomb trailers, $171,909.50.
Sarvas Electrical Co., Brooklyn, N. Y., motor generators, $1319.
Schnacke & Fawcett Mfg. Co. Inc., Evansville, Ind., projectile proofs, $26,235.
Scullin Steel Co., St. Louis, components for bombs, $17,560.
Security Steel Equipment Co., Avenel, N. J., office desks, $1937.80.
Sheffield Gage Corp., Dayton, O., gages for panoramic telescopes, $5009.76.
Simplex Wire & Cable Co., Cambridge, Mass., lead cable, $2282.
Sipp-Eastwood Corp., Paterson, N. J., steel, $1742.50.
SKF Industries Inc., Philadelphia, roller bearings, $9132.
Somerville Machine & Foundry Co., Somerville, Mass., manganese bronze castings, $1279.86.
Standard Gage Co. Inc., Poughkeepsie, N. Y., gages, $6115.29.
Standard Steel Spring Co., Blood Bros. Machine Co. Division, Allegan, Mich., flexible joints, $4528.
Star Cutter Co., Detroit, tools, $158,966.02.
Steel Improvement & Forge Co., Cleveland, forgings, $9345.
Stokes, F. J., Machinery Co., Philadelphia, punch and die holders, $1760.
Sturtevant, B. F., Co., Hyde Park, Mass., pressure, ventilating fans, $2002.56.
Suburban-Essex Machinists Inc., Orange, N. J., gages, $22,463.
Summerill Tubing Co., Bridgeport, Pa., steel tubing, $8422.70.
Sunnen Products Co., St. Louis, honing machines, $9760.80.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., forgings, $260,000.
Thompson Products Inc., Detroit, fuze adapters, $43,023.80.
Thurston Mfg. Co., Providence, R. I., end mills, $2165.70.
Titeflex Metal Hose Co., Newark, N. J., tubing and conduit, $4505.
Torrington Co., Torrington, Conn., bearings, $1959.75.
Townsend, Samuel P., Lawnmower Co., Bloomfield, N. J., shells, $359,000.
Triumph Explosives Inc., Elkton, Md., signal lights, $104,900.
Union Steel Chest Corp., LeRoy, N. Y., steel chests, $39,701.89.
Union Twist Drill Co., Chicago, cutters, $1446.
Unique Specialties Inc., New York, cutters, strippers, toggle arms, rivets, set-back pins for fuze, detonator holders, and firing pin guides, $19,795.
United Specialties Co., Philadelphia, magazine assemblies and submachine guns, $767,112.
Universal Castings Corp., Chicago, aluminum bronze castings, $1110.
Universal Cyclops Steel Corp., Titusville, Pa., steel, $1447.44.
Universal Metal Products Co. Inc., New York, gun parts, $34,654.69.
U. S. Tool & Mfg. Co., Dearborn, Mich., steel milling cutters, $1938.70.
Utilities Engineering Co., Philadelphia, install lighting system, $20,662.
Vanadium Alloys Steel Co., Latrobe, Pa., tool steel, $5343.07.
Van Dorn Electric Tool Co., Towson, Md., machine tools, $4472.72.
Vascoloy-Ramet Corp., North Chicago, Ill., tools, $6382.08.
Veit & Young, Philadelphia, punches and dies, $8095.
Verduin, John, Machine Corp., Paterson, N. J., machines, $9000.
Vickers Inc., Waterbury Tool Division, Waterbury, Conn., gears, $310,000.
Vinco Corp., Detroit, gages, $9041.50.
Vortox Mfg. Co., Claremont, Calif., parts for tanks, $1104.80.
Weldon Tool Co., Cleveland, cutters, $2807.50.
Wel-Ever Piston Ring Co., Toledo, dummy fuzes, $12,892.10.
Wiedemann Machine Co., Philadelphia, gages, $9608.50.
West & Dodge Thread Gage Co. Inc., Boston, gages for panoramic telescopes, $1085.19.
White Motor Co., Cleveland, parts for scout car, $20,815.66.
Whitman & Barnes, Detroit, oil hole drills, $1473.60.
Williams, J. H., & Co., Buffalo, forgings for guns, $2368.80.
Willys-Overland Motors Inc., Toledo, O., ¼-ton trucks, $1,946,717.50.
Wood, Alan, Steel Co., Conshohocken, Pa., steel floor plates, $1826.09.
Wood, Gar, Industries Inc., Detroit, parts for tractors, $1640.10.
Yoder Co., Cleveland, shells, $486,400.
Youngstown Sheet & Tube Co., Youngstown, O., steel, $1413.59.
Zimmerman Steel Co., Bettendorf, Iowa, steel castings, $10,213.27.

Corps of Engineers Awards

Allis-Chalmers Mfg. Co., Springfield, Ill., loaders, $36,328.50.
American Car & Foundry Co., Berwick, Pa., railroad cars, $23,500.
Baker-Raulang Co., Cleveland, tractors, $5950.
Barber-Greene Co., Aurora, Ill., ditchers, truck loaders, $72,247.14.
Buffalo-Springfield Roller Co., Springfield, O., rollers with spare parts, $22,231.60.
Case, J. I., Co., Racine, Wis., tractors, parts for engines, $28,292.23.
Caterpillar Tractor Co., Peoria, Ill., diesel electric switchboard set, tractors, graders, $23,353.18.
C. H. & E. Mfg. Co., Milwaukee, pump-



35-Ton Linoleum Press Stamps Plane Wing Tips

■ Converted to stamp out aluminum wing tips for airplanes, this huge 35-ton press was formerly used by Armstrong Cork Co., Lancaster, Pa., in linoleum manufacture. In addition to several types of shells and shell casings the company is fabricating for the government, it was recently awarded a subcontract for airplane parts by Glenn L. Martin Co., Baltimore. Armstrong formerly manufactured cork products, linoleum, felt rug bases, insulating fire bricks and related items.

NEA photo

ing sets, $5465.25.
Chicago Flexible Shaft Co., Chicago, small hammer forges, $3108.11.
Chicago Pneumatic Tool Co., Chicago, air compressors, parts for engines, hose, and air receivers, $28,514.10.
Chicago, Rock Island & Pacific Railway Co., Chicago, turnouts, $4672.
Cincinnati Tool Co., Norwood, Cincinnati, siderail clamps, clamping handles and screws, bearing plates and swivel pins, $26,435.53.
Columbian Steel Tank Co., Kansas City, Mo., water tanks, $4050.
Consolidated Steel Warehouse Co., Philadelphia, steel, $40,707.26.
Cook, A. D., Inc., Lawrenceburg, Ind., pumping sets, $5607.13.
Coolerator Co., Duluth, material racks, aircraft assembly plant, Ft. Crook, Nebr., $8983.50.
Crown Iron Works Co., Minneapolis, wire reels with stand, electric lighting equipment, $15,750.
Davenport Besler Corp., Davenport, Iowa, locomotives, $64,050.
Dietzgen, Eugene, Co. Inc., Chicago, levels and transits, $16,890.
Dobbie Foundry & Machine Co., Niagara Falls, N. Y., steel derricks, $9500.
Eagle Crusher Co. Inc., Galion, O., repair parts for crushers, $3445.50.
Etnyre, E. D., & Co., Oregon, Ill., distributors, $9048.
Fairchild Aviation Corp., Jamaica, N. Y., stereocomparagraphs, $24,537.50.
Fries, Beall & Sharp Co., Washington, wheelbarrows, $27,180.
General Electric Co., Schenectady, N. Y., welders, $6461.24.
General Motors Corp., Chevrolet Division, Detroit, pick-up trucks, $2572.85.
Graybar Electric Co. Inc., New York, miscellaneous electrical supplies, $12,832.17.
Hill, C. V., & Co. Inc., Trenton, N. J., refrigerator boxes and condensing units, $3244.
Hobart Bros. Co., Troy, O., welding outfits, $4828.
Hough, Frank G., Co., Libertyville, Ill., sweepers, $2043.
Hudson Supply & Equipment Co., Washington, centrifugal pump unit, $14,362.
Independent Pneumatic Tool Co., Aurora, Ill., spare parts for air tools, $27,808.40.
Ingersoll-Rand Co., Athens, Pa., pneumatic drills and hammers, $2886.80.
International-Stacey Corp., Columbus, O., searchlights, towers, $23,466.
Iron City Tool Works, Pittsburgh, quarry picks, $15,200.
Jaeger Machine Co., Columbus, O., double drum hoists, $11,794.
Keuffel & Esser Co., Hoboken, N. J., plotting scales, $5580.
Kilby Steel Co., Anniston, Ala., screw posts, $62,780.
Koehring Co., Milwaukee, parts for trail-dumps, $4145.12.
LaCrosse Trailer & Equipment Co., LaCrosse, Wis., trailers, semitrailers and dollies, $28,594.
Leach Bros., Oshkosh, Wis., ponton bridge equipment, $3828.50.
LeTourneau, R. G., Inc., Toccoa, Ga., rooters, scrapers, sheepsfoot rollers, $22,066.30.
Littleford Bros., Cincinnati, rollers, $4900.
Mall Tool Co., Chicago, repair parts for saws, $5345.25.
Midwest Steel & Iron Works Co., Denver, structural steel, Lowry field, $5074.
Onan, D. W., & Sons, Minneapolis, generator sets, $7345.
Osgood Co., Marion, O., gasoline engine driven shovels, $179,604.
Outboard Marine & Mfg Co., Johnson Motors Division, Waukegan, Ill., outboard motors, $5079.20.
Paving Supply & Equipment Co., Springfield, O., tandem rollers, heaters $12,929.58.
Peerless Pump Division, Canton, O., pumping sets, $3664.93.
Porter, H. K., Inc., Everett, Mass., wire cutters, $24,450.
Ransome Concrete Machinery Co., Dunellen, N. J., concrete mixers, $9953.10.
Reynolds Wire Co., Dixon, Ill., copper wire cloth, $6732.
Rogers Bros. Corp., Albion, Pa., trailers, $7955.
Saltzman, J. G., Inc., New York, photographic printers, $2525.
Schramm Inc., West Chester, Pa., air compressors, $6900.
Sheriff Motor Co., Washington, tractor-type trucks, $13,781.82.
Shovel Supply Co., Dallas, Tex., rollers, $2600.
Snow Removal Equipment Co., San Francisco, snow plows, $14,416.
Sullivan Machinery Co., Michigan City, Ind., drills and equipment, $23,822.20.
Trailer Co. of America, Cincinnati, parts for semitrailers, $6745.23.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., track bolts, tie plates, $4743.15.
Vulcan Iron Works, Wilkes-Barre, Pa., locomotives, $63,975.
Wallace & Tiernan Co. Inc., Newark, N. J., water purification units, $236,915.05.
Wheeling Steel Corp., Wheeling, W. Va., pipe, $20,124.94.
Whitcomb Locomotive Co., Rochelle, Ill., locomotives, $127,660.
Willborn Bros. Co. Inc., Amarillo, Tex., steel tanks, $4920.
Wood Shovel & Tool Co., Piqua, O., shovels, $4040.
York Ice Machinery Corp., York, Pa., refrigeration units, $47,873.70.

Signal Corps Awards

American Automatic Electric Sales Co., Chicago, protectors, terminal blocks and attendants' cabinets, shelf linefinders, selectors, connectors, $18,843.10.
Bendix Radio Corp., Towson, Md., components for frequency meter sets, $55,960.81.
Edwards & Co., Norwalk, Conn., switches, $20,188.
Graybar Electric Co. Inc., Chicago, loading coil cases, $48,973.
Jensen Radio Mfg. Co., Chicago, loudspeakers, $1452.
Ulmer, A. J., Rutherford, N. J., ground rods, $4824.
United Transformer Corp., New York, radio filters, $24,178.

Medical Corps Awards

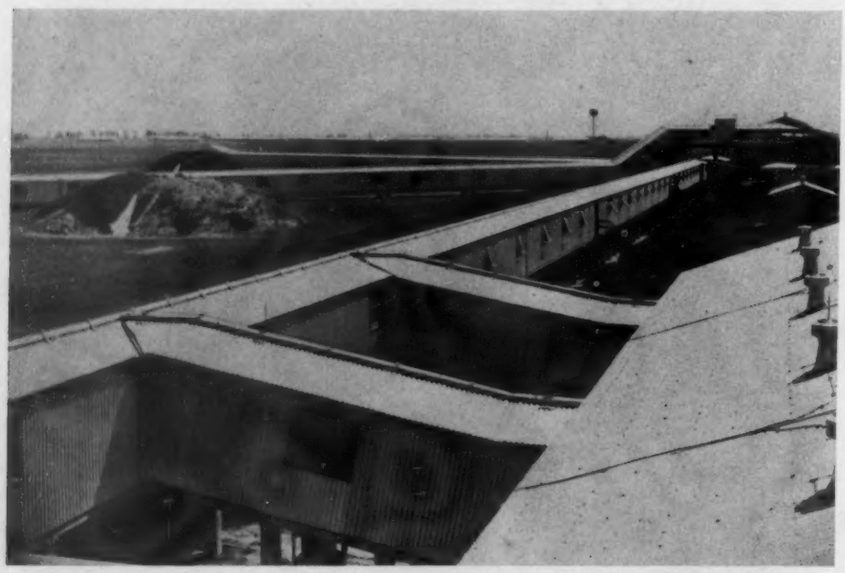
Anchor Products Co., Chicago, surgical needles, $51,850.
Firestone Tire & Rubber Co., Fall River, Mass., canister and carrier assemblies, $423,355.
Hertner Electric Co., Cleveland, automatic battery charging units, $11,963.
Oneida Ltd., Sherrill, N. Y., forceps, $26,997.50.
Polar Ware Co., Sheboygan, Wis., mess and hospital equipment, $52,861.
Rex Cutlery Corp., Irvington, N. J., scissors, $36,850.
Salta Corp., Bedford, Va., outlet valves, $4233.
Torsion Balance Co., Jersey City, N. J., prescription scales, $18,150.
White, S. S., Dental Mfg. Co., Prince Bay, Staten Island, N. Y., dental burs and equipment, $153,039.78.
Witt Cornice Co., Cincinnati, galvanized iron cans, $8664.52.

Air Corps Awards

Aircraft Fitting Co., Cleveland, fittings, $57,615.60.
Allith-Prouty Inc., Danville, Ill., airplane shoring assemblies, $285,300.
Aluminum Co. of America, Pittsburgh, rivets, $431,085.55.
Bendix Aviation Corp., Bendix Products Division, South Bend, Ind., carburetors and spare parts, $130,052.41; Scintilla Magneto Division, Sidney, N. Y., spare parts for magnetos, assemblies, $133,677.94.
Breeze Corp. Inc., Newark, N. J., flowmeters, $286,380.
Butler Mfg. Co., Kansas City, Mo., prefabricated portable warehouses, $259,308.
Chicago Pneumatic Tool Co., Detroit, pneumatic hammer riveters, $124,464.50.
Fruehauf Trailer Co., Detroit, semitrail-

(Please turn to Page 173)

New $30,000,000 Bomb and Shell Loading Plant



■ **Loading lines and underground shelters of the $30,000,000 bomb and shell loading plant at Elwood, Ill., are shown in this general view of part of the new ordnance unit. Shelters are for protection of workmen during electrical storms or in case of fire. Capacity operations will require 8265 employes, it is reported, and will make this plant one of the largest of its kind. NEA photo**

Canada Rations Steel Distribution To Curb Nonessential Goods Production

TORONTO, ONT.

■ DISPARITY between Canada's iron and steel production and demand is steadily growing larger, and despite increased imports there is insufficient tonnage to meet requirements of the Dominion's war industry and civilian producers. Because of this factor, according to C. D. Howe, minister of munitions and supply, production of war materials has reached the point where the government must "directly curtail through rationing measures" supplies available to manufacturers for nonessential purposes.

Extent of the rationing will be in conformity with availability of needed raw materials and whatever supplies are so diverted from nonessential requirements will be utilized directly in war manufacture. Plant capacity which may become idle through curtailment of civilian goods production will be "instantly" converted to war work, it was reported.

Industry and Subcontract Co-ordination Branch of the Department of Munitions and Supply has been organized to spread industrial war effort to smaller shops and plants throughout Canada. F. L. Jeckell, formerly assistant to R. P. Bell, director of aircraft production, is director general of the new unit. The organization also is to provide liaison between prime contractors and suitable candidates for subcontracts.

R. C. Berkinshaw, director general, Priorities Branch, Munitions and Supply Department, declared last week that Canadian manufacturers working on war contracts and dependent on delivery of materials from suppliers in United States must adjust their requirements to the priority rating in effect in the States.

System giving complete control over warehouse supplies of iron and steel in Canada was recently introduced by F. B. Kilbourn, steel controller. Materials specifically referred to include steel plates, blue annealed and black sheets, structural steel larger than bar mill sizes, and cold-rolled steel. Other lines will be subsequently added as determined by the controller.

Dominion Bridge Co. Ltd., Lachine, Que., has begun operations at its East Calgary Rolling Mills, Calgary, Alta., formerly known as the Manitoba Rolling Mills. Only the 10-inch mill is currently operating, but the 20-inch mill is to be put into production as quickly as necessary repairs are completed.

Report from Ottawa last spring was that equipment from this mill would be moved to Vancouver, B. C., and would depend upon western scrap supplies. This plan, however, fell through and the company has gone into production at Calgary.

Contracts placed by the Department of Munitions and Supply in the week ended Aug. 26 totaled 3706, with $59,325,214 aggregate value. Largest award was $29 673,000 and was placed with North Vancouver Ship Repairs Ltd., Vancouver, for construction of cargo vessels. Orders placed with companies in United States were valued at $2,-093,906. Contracts included:

Shipbuilding: Pictou Foundry & Machine Co., Pictou, N. S., $20,452; W. R. Ritcey & Zinc Ltd., Lower LaHave, N. S., $17,600; LeBlanc Shipbuilding Co. Ltd., Weymouth, N. S., $167,000; St. John Drydock & Shipbuilding Co. Ltd., St. John, N. B., $2,398,240; Foundation Maritime Ltd., Montreal, Que., $169,800; Chantier Maritime Ltd., St. Laurent, Que., $270,-974; Minett Shields Ltd., Bracebridge, Ont., $243,000; Greavette Boats Ltd., Gravenhurst, Ont., $164,000; Honey Harbour Shipbuilding Co. Ltd., Midland, Ont., $167,000; J. J. Taylor & Sons, Toronto, $167,000; North Vancouver Ship Repairs Ltd., Vancouver, B. C., $29,673,-000; Turner Boat Works, Vancouver, $5346.

Instruments: Pritchard Andrews Ltd., Ottawa, Ont., $19,080.

Electrical equipment: Canadian Marconi Co. Ltd., Montreal, $26,247; John Hay Co. Ltd., Eastview, Ont., $133,288; Northern Electric Co. Ltd., Ottawa, $233,260.

Machinery: Canadian Liquid Air Co., Montreal, $11,435; Rudel Machinery Co., Montreal, $26,621; Mussens Ltd., Montreal, $72,967; Transport Department, Ottawa, $32,888; Canadian Fairbanks-Morse Co., Ottawa, $10,155.

Tools: Union Twist Drill Co. Ltd., Rock Island, Que., $7562; Ottawa Car & Aircraft Ltd., Ottawa, $7995; Canadian General Electric Co. Ltd., Ottawa, $16,250; Weaver Industries Ltd., Chatham, Ont., $5857.

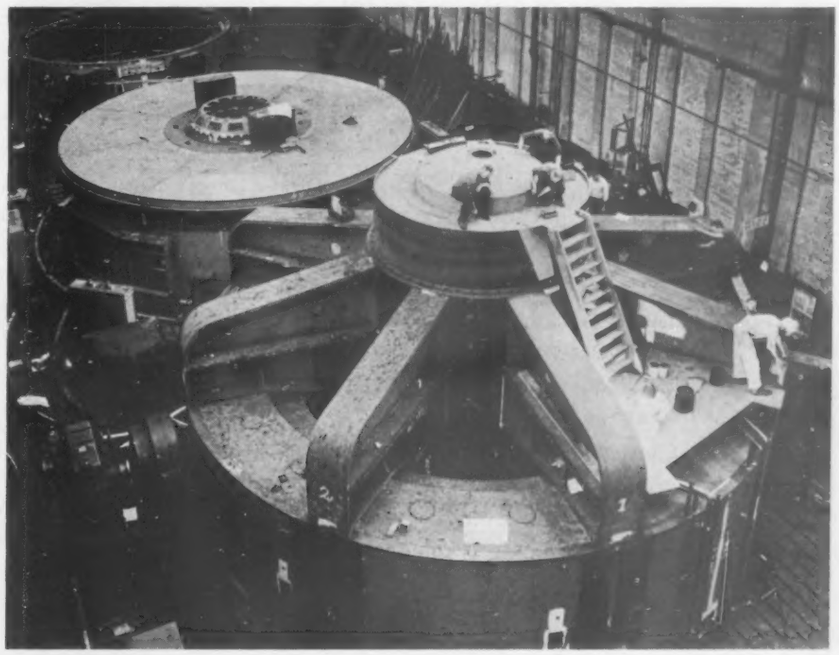
Hardware: Frost Steel & Wire Ltd., Hamilton, Ont., $36,815; Morrow Screw & Nut Co. Ltd., Ingersoll, Ont., $5884.

Land transport: George W. Reed & Co. Ltd., Montreal, $16,506; General Motors Products of Canada Ltd., Oshawa, Ont., $397,155; Brantford Coach & Body Ltd., Brantford, Ont., $43,644; Canadian Top & Body Co. Ltd., Tilbury, Ont., $35,240; Ford Motor Co. of Canada Ltd., Windsor, Ont., $313,807; Gar Wood Industries Ltd., Windsor, $6640; Gotfredson Ltd., Windsor, $14,798.

Aircraft: Overseas Requisition, England, $9108; Canadian Pratt & Whitney

(*Please turn to Page* 175)

Waterwheel Power Generators for Defense



■ **Vast quantities of power, vitally important to modern industry in the defense program, will be created by these giant waterwheels built by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. In the foreground is shown a 108,000-kilowatt generator, identical to two others built by Westinghouse for the Grand Coulee dam, Washington, and reported the world's largest. Directly behind it is a 40,000-kilowatt generator for the TVA Pickwick Landing dam, in Tennessee. Third from front is a stator for a 33,333-kilowatt generator that is to go to the TVA Watts Bar dam. These three generators, it is said, will produce in one year the amount of energy expended by 100,000 men in the 20 years it took them to build the Great Pyramid of Egypt. NEA photo**

STEEL

Washington Rolls up Sleeves

■ SINCE Sept. 1 several things have happened in Washington which seem to indicate that a new and encouraging line of thinking is in the ascendency in certain sections of government officialdom.

One of these straws in the wind is the attitude toward the situation created when the Federal Shipbuilding & Dry Dock Co. was taken over by the United States Navy Department. Almost everybody, including union labor leaders and pro-union administration officials, now feels that this case was bungled. The government is trying to find a way to handle this hot potato which will avoid the appearance of establishing the closed shop or even the "maintenance of membership" principle as national policy.

In short, the pendulum of labor appeasement swung too far to the left. Belatedly the government leaders now recognize this fact and are concerned about the consequences.

This is a wholesome development.

• • •

A second indicator is the growing realization in official quarters that the alarmist tactics recently employed in relation to scarcities of materials were ill advised.

The public has begun to wonder to what extent these alleged shortages are real or imagined. Washington's about-face on Ickes' hysteria over eastern gasoline has been a factor in the changed attitude toward scarcities.

The determination of SPAB, the new super defense board, to find out definitely the relation of supply to demand, including a thorough check-up of inventories and of hoarding, if any, is a reflection of the new spirit of realism which is gripping Washington.

This, too, is a wholesome trend.

• • •

A third significant event was the refusal of SPAB to allocate steel plates for the proposed pipe line from Texas to New Jersey. The board does not want to divert plates to this project unless it is essential.

This note of caution is most encouraging. Heretofore scores of similar proposals have been accepted either provisionally or finally without regard to whether the project was sound or necessary or whether the material for it could be spared from defense requirements.

A fourth refreshing note was Donald Nelson's quick clean-up of the jam of priority applications in OPM. He drafted a small army of experts in handling mail. They brought order out of chaos in an amazingly short time.

This should teach officialdom that the defense program needs experts—men who "know how."

These and many other little things point to a new respect for efficiency and a growing impatience with the bungling of novices and experimenters. They are signs of progress.

E. L. Shaner

EDITOR-IN-CHIEF

Sept. 15, 1941

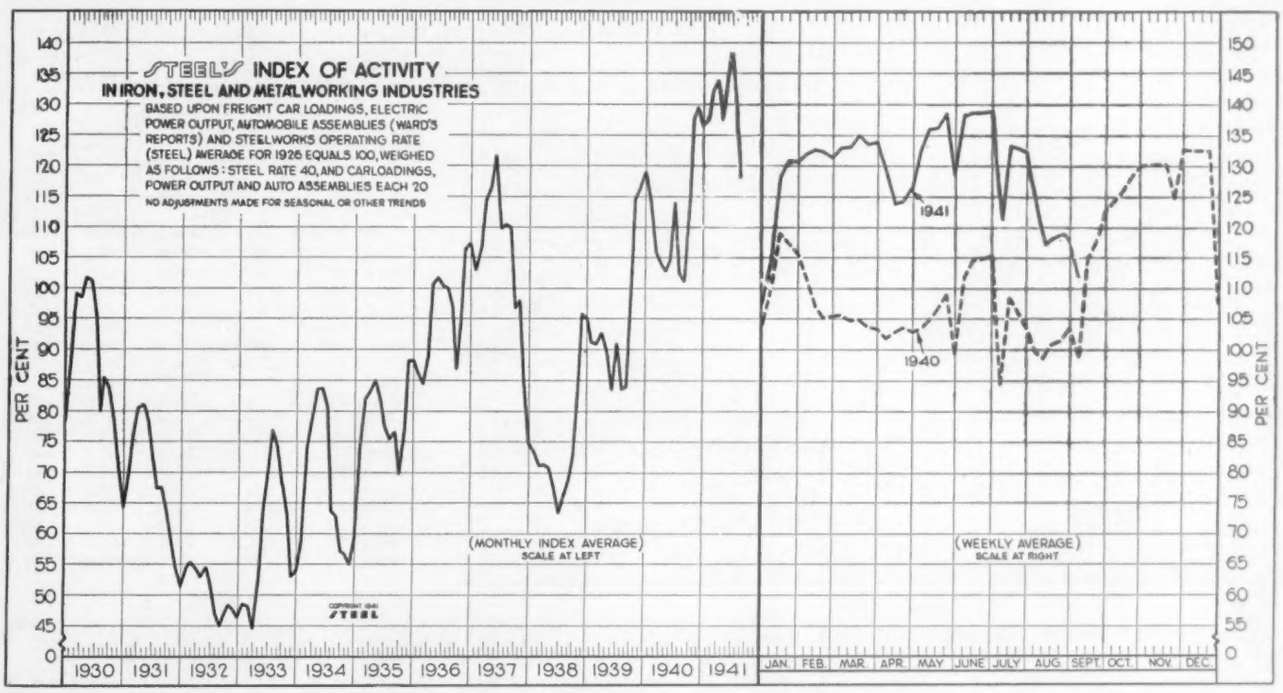
The *BUSINESS TREND*

Activity Index Reflects Holiday Interruption

■ RECORDS of business for the week ended Sept. 6 are distorted somewhat by the interruption of activity occasioned by the observation of Labor Day. Due to this factor STEEL's index of activity declined 6.1 points to 112.1 in the holiday week. This compares with a drop of 4.8 points in the like period a year ago, 10.5 points in 1937 and 10.6 in 1929.

Each of the industrial indicators composing the index declined during Labor Day week. However, an encouraging rebound probably occurred in the week ended Sept. 12 and indications point to a continuation of this upward tendency in most instances through the fall months this year. The underlying trend of industrial production points upward, despite the temporary dislocations of operating schedules resulting from the influence of the expanding defense program.

STEEL's index average for the month of August declined sharply to 118.1 from the 128.7 level recorded during the preceding month. The August index average was adversely affected by the normal seasonal decline in automobile production, but topped the 101.1 average of August last year by a substantial margin.

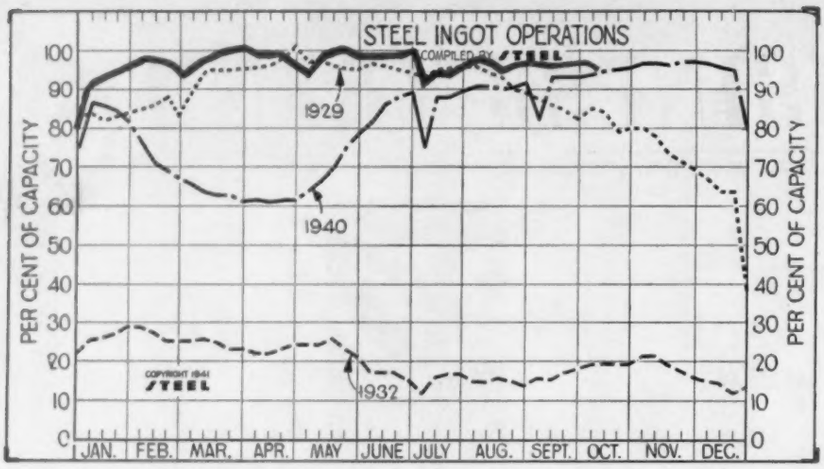

STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100, WEIGHED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
(WEEKLY AVERAGE) SCALE AT RIGHT
1941
1940
1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL'S index of activity declined 6.1 points to 112.1 in the week ended Sept. 6:

Week Ended	1941	1940
June 28	138.8	115.3
July 5	120.9	94.2
July 12	133.4	108.5
July 19	133.2	106.0
July 26	132.9	103.4
Aug. 2	123.3	99.7
Aug. 9	117.5	98.4
Aug. 16	118.2	100.8
Aug. 23	118.5	101.4
Aug. 30	118.2†	103.5
Sept. 6	112.1	98.7

†Revised.

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101 2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	.....	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	.....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3



Steel Ingot Operations

(Per Cent)

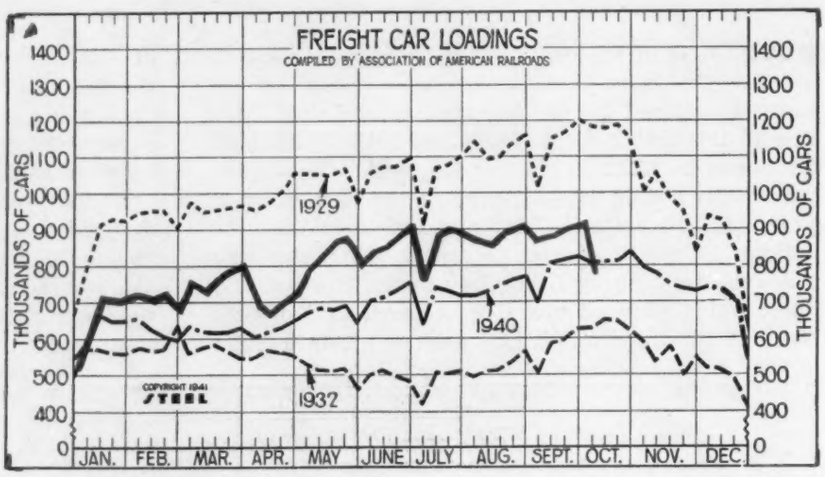
Week ended	1941	1940	1939	1938
Sept. 6....	95.5	82.0	62.0	41.5
Aug. 30....	96.5	91.5	64.0	44.5
Aug. 23....	96.0	90.5	63.5	43.5
Aug. 16....	95.5	90.0	63.5	41.5
Aug. 9....	96.0	90.5	62.0	40.0
Aug. 2....	97.5	90.5	60.0	40.0
July 26....	96.0	89.5	60.0	37.0
July 19....	95.0	88.0	56.5	36.0
July 12....	95.0	88.0	50.5	32.0
July 5....	92.0	75.0	42.0	24.0
June 28....	99.5	89.0	54.0	28.0
June 21....	99.0	88.0	54.5	28.0
June 14....	99.0	86.0	52.5	27.0
June 7....	99.0	81.5	53.5	25.5
May 31....	99.0	78.5	52.0	25.5
May 24....	100.0	75.0	48.0	28.5
May 17....	99.5	70.0	45.5	30.0
May 10....	97.5	66.5	47.0	30.0

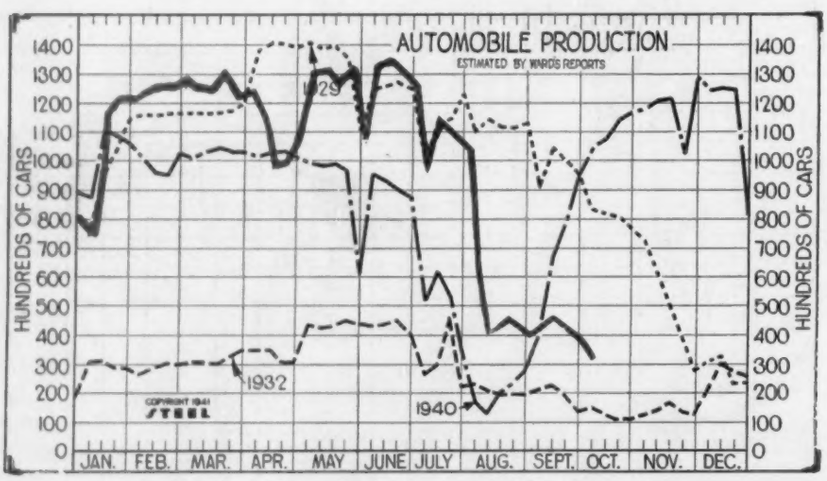
Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
Sept. 6.....	798	695	667	569
Aug. 30.....	912†	769	722	648
Aug. 23.....	900	761	689	621
Aug. 16.....	890	743	674	598
Aug. 9.....	879	727	665	590
Aug. 2.....	883	718	661	584
July 26.....	897	718	660	589
July 19.....	899	730	656	581
July 12.....	876	740	674	602
July 5.....	740	636	559	501
June 28.....	909	752	666	589
June 21.....	886	728	643	559
June 14.....	863	712	638	556
June 7.....	853	703	635	554
May 31.....	802	639	568	503
May 24.....	886	687	628	562

†Revised.





Auto Production

(1000 Units)

Week ended	1941	1940	1939	1938
Sept. 6....	32.9	39.7	26.9	17.5
Aug. 30....	40.0	27.6	25.2	22.2
Aug. 23....	45.5	23.7	17.5	18.7
Aug. 16....	45.6	20.5	13.0	23.9
Aug. 9....	41.8	12.6	24.9	13.8
Aug. 2....	62.1	17.4	28.3	14.8
July 26....	105.6	34.8	40.6	30.4
July 19....	109.9	53.0	47.4	32.1
July 12....	114.3	65.2	61.6	42.0
July 5....	96.5	52.0	42.8	25.4
June 28....	127.9	87.6	70.7	40.9
June 21....	133.6	90.1	81.1	40.9
June 14....	134.7	93.6	78.3	41.8
June 7....	133.6	95.6	65.3	40.2
May 31....	106.4	61.3	32.4	27.0
May 24....	133.6	96.8	67.7	45.1
May 17....	127.3	99.0	80.1	46.8
May 10....	132.6	98.5	72.4	47.4

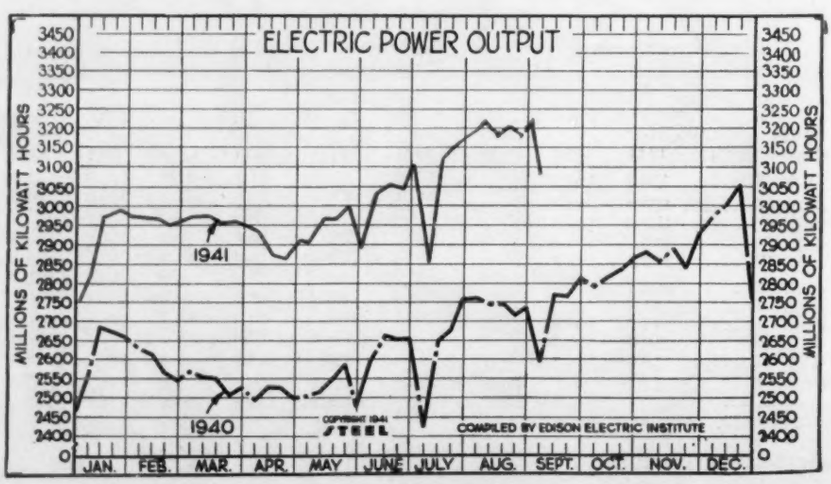
Electric Power Output

†

(Million KWH)

Week ended	1941	1940	1939	1938
Sept. 6.....	3,096	2,592	2,376	2,110
Aug. 30.....	3,224	2,736	2,442	2,217
Aug. 23.....	2,193	2,714	2,434	2,202
Aug. 16.....	3,201	2,746	2,454	2,207
Aug. 9.....	3,196	2,743	2,414	2,198
Aug. 2.....	3,226	2,762	2,400	2,194
July 26.....	3,184	2,761	2,427	2,160
July 19.....	3,163	2,681	2,295	2,085
July 12.....	3,141	2,652	2,403	2,154
July 5.....	2,870	2,425	2,145	1,937
June 28.....	3,121	2,660	2,396	2,074
June 21.....	3,056	2,654	2,362	2,082
June 14.....	3,057	2,665	2,341	2,051
June 7.....	3,042	2,599	2,329	2,057

†New series: Includes additional governmental and power generation not previously reported.


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
1940
COPYRIGHT 1941 STEEL
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

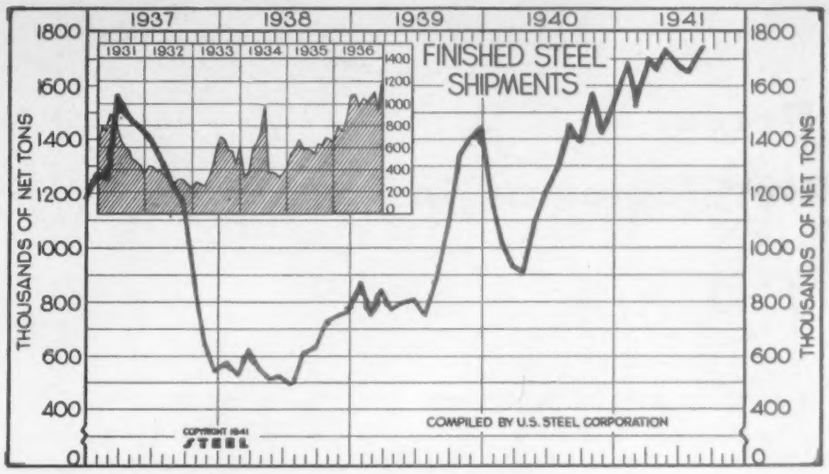
Finished Steel Shipments

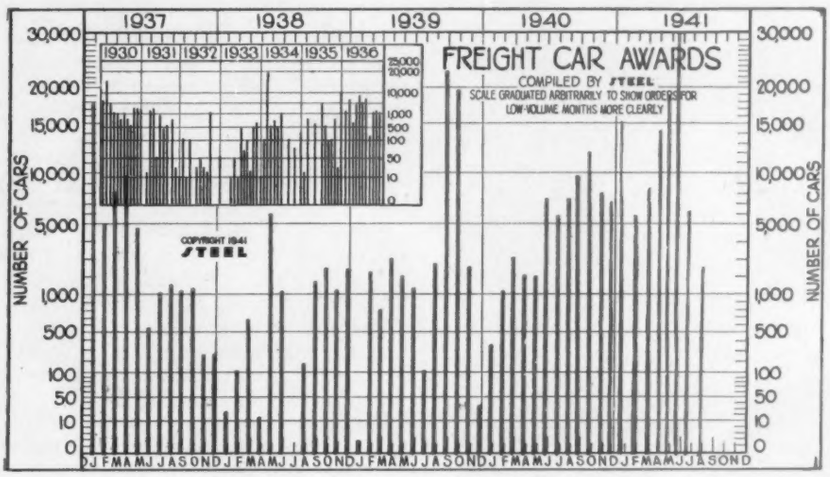
U. S. Steel Corp.

(Unit 1000 Net Tons)

	1941	1940	1939	1938	1937
Jan....	1682.5	1145.6	870.9	570.3	1268.4
Feb....	1548.5	1009.3	747.4	522.4	1252.8
Mar...	1720.4	931.9	845.1	627.0	1563.1
Apr....	1687.7	907.9	771.8	550.5	1485.2
May ..	1745.3	1084.1	795.7	509.8	1443.5
June ..	1668.6	1209.7	807.6	525.0	1405.1
July ..	1666.7	1296.9	745.4	484.6	1315.3
Aug. ..	1753.7	1455.6	885.6	615.5	1225.9
Sept...	.....	1392.8	1086.7	635.6	1161.1
Oct....	.....	1572.4	1345.9	730.3	876.0
Nov. ..	.....	1425.4	1406.2	749.3	648.7
Dec....	.....	1544.6	1444.0	765.9	539.5
Tot.†	.....	14976.1	11707.3	7315.5	14097.7

†After year-end adjustments.



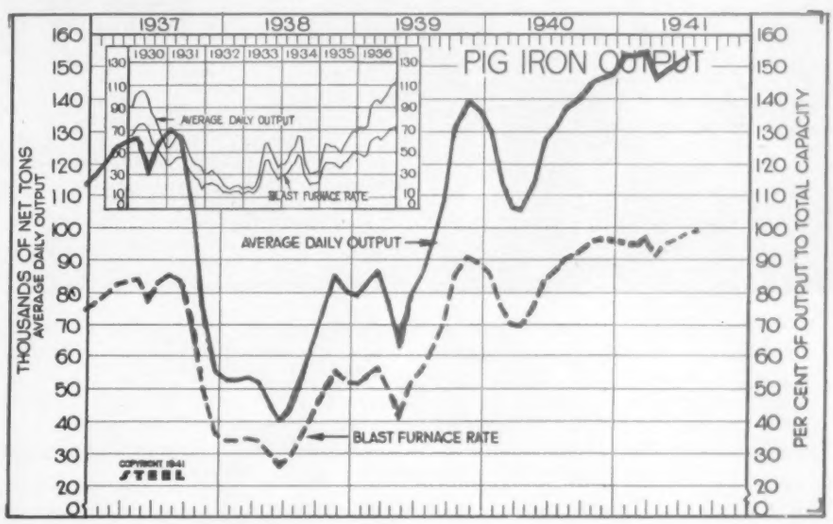

1937
1938
1939
1940
1941
1930 1931 1932 1933 1934 1935 1936
FREIGHT CAR AWARDS
COMPILED BY STEEL
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW-VOLUME MONTHS MORE CLEARLY
NUMBER OF CARS
COPYRIGHT 1941 STEEL
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

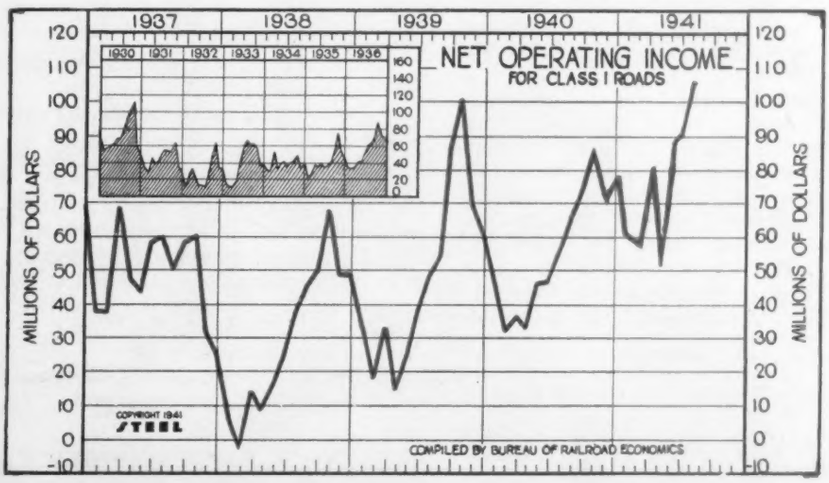
Freight Car Awards

	1941	1940	1939	1938
Jan.	15,169	360	3	25
Feb.	5,508	1,147	2,259	109
March ...	8,074	3,104	800	680
April	14,645	2,077	3,095	15
May	18,630	2,010	2,051	6,014
June	32,749	7,475	1,324	1,178
July	6,459	5,846	110	0
Aug.	2,668	7,525	2,814	182
8 mos. ...	103,902	29,544	12,456	8,303
Sept.	.....	9,735	23,000	1,750
Oct.	.....	12,195	19,634	2,537
Nov	.....	8,234	2,650	1,232
Dec.	.....	7,181	35	2,581
Total ...	.....	66,889	57,775	16,303

Pig Iron Production

	Daily average —Net Tons—			Blast furnace —Rate (%)—		
	1941	1940	1939	1941	1940	1939
Jan.	150,524	129,825	78,596	95.5	85.4	51.0
Feb.	150,244	113,943	82,407	95.3	75.0	53.5
Mar.	151,707	105,502	86,465	96.3	69.5	56.1
Apr.	144,685	104,635	76,732	91.8	68.9	49.8
May	148,262	112,811	62,052	94.1	74.2	40.2
June	151,701	127,103	79,125	96.3	83.6	51.4
July	153,749	130,984	85,121	97.6	86.1	55.0
Aug.	154,343	136,599	96,122	98.0	89.9	62.4
Sept.	.....	139,085	107,298	....	91.5	69.7
Oct.	.....	143,152	131,053	....	94.2	85.2
Nov.	.....	146,589	138,883	....	96.4	90.3
Dec.	.....	146,544	136,119	....	96.4	88.5
Ave.	.....	128,128	86,375	....	84.3	62.6





Class I Railroads
Net Operating Income

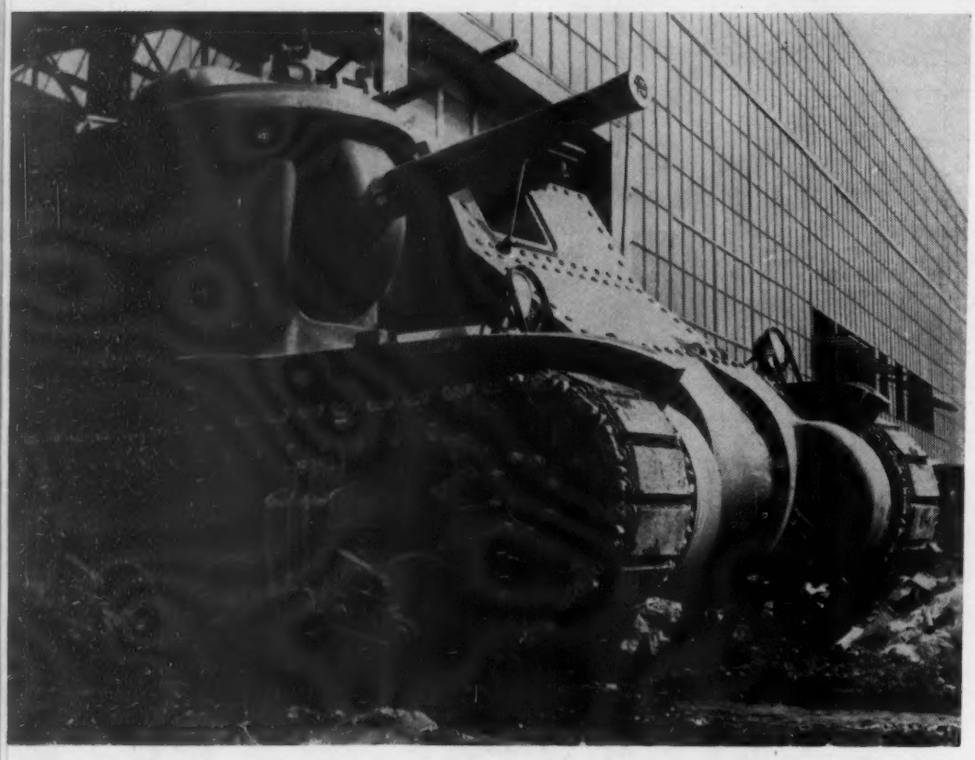
(Unit: $1,000,000)

	1941	1940	1939	1938
Jan.....	$62.36	$45.57	$32.89	$7.14
Feb.....	58.49	32.86	18.59	1.91*
Mar.....	80.63	36.73	34.32	14.73
April....	52.57	33.82	15.32	9.40
May.....	88.63	47.08	25.10	16.67
June	93.26	47.42	39.10	25.16
July.....	106.31	57.08	49.01	38.43
Aug.....	.....	66.01	54.59	45.42
Sept.....	.....	74.19	86.43	50.36
Oct.....	.....	86.99	101.62	68.57
Nov.....	.....	71.10	70.35	49.67
Dec.....	.....	78.79	60.95	49.37
Average .	.....	$56.84	$49.02	$31.02

*Indicates deficit.

Recent Developments in TANK ENGINEERING

By BRIG. GEN. G. M. BARNES
United States Army
Assistant Chief of Ordnance
War Department



Here, leaving the Chrysler tank arsenal for the first time, is number one of the great fleet of "medium" tanks being made for the United States Army. Actually this is the largest American tank now in production, or for which production has been arranged. It is reputed to have firing power as great as any in Europe, if not greater. It carries a 75-millimeter cannon that fires 15,000 yards, a 37-millimeter anti-aircraft gun that can be fired point blank, four machine guns—two of .30 caliber and two of .50 caliber

■ THE PHENOMENAL victories achieved by the Germans in the battle for France and elsewhere were due to the superb co-ordination between the two relatively new branches of the army, the air corps and the armored force. While the British first wrote and talked about the use of the tank as a fighting weapon, the Germans were the ones who put these theories into successful operation. They grouped these vehicles together in great masses and called these armored organizations "Panzer Divisions". In the battle for France they brought these fighting vehicles to bear against the French and British in such great numbers that all opposition was quickly stamped out with the help of the air corps.

Tank Design: Like the design of any other piece of machinery, tank design is largely a matter of making satisfactory compromises between the various conflicting requirements. The military characteristics which must be considered are: *First, armament; second, armor protection; third, mobility* (mobility includes trench crossing ability, maneuverability, speed, and radius of action); *fourth, weight; fifth, number of men in crew; and sixth, speed of production.* All these basic characteristics are interdependent one upon the other.

From paper presented at spring meeting of the Society of Automotive Engineers, White Sulphur Springs, Va., June 3, 1941.

Armament: The purpose of any tank is to carry safely the guns, ammunition and personnel necessary for their operation to the desired point in the minimum of time so these weapons may be used effectively. Tank armament must be able to accomplish the following:

Penetration of armor plate, best accomplished by higher-velocity and low-trajectory weapons. This involves the use of high-quality armor-piercing ammunition.

High explosive demolition, most effectively accomplished by a low-velocity thin-wall projectile.

Personnel targets, most effectively overcome by small-caliber machine gun fire.

Anti-aircraft fire. This involves precision firing against a high-speed target moving in three dimensions.

The number of high-power weapons is quickly limited by the number of men in the crew, the space available for guns and ammunition, and by weight limitations. To provide space to serve effectively the several types of weapons required may result in a vehicle which has too large a silhouette and is too heavy if the desired armor protection is maintained.

Specific armament design problems include:

—Provision for sufficient space for traverse recoil and elevation of the gun.

—Provision for convenient means of serving ammunition to weapons.

—Ammunition storage.

—Sighting and protective vision devices for gunners.

—Comfort and secure positioning of gun crew.

—Firing and gun-pointing mechanisms.

—Selection or design of weapons suitable for tank installation.

—Provision for gun mounts which will not only provide the desired traverse, elevation and recoil, but which will also protect the tank personnel from enemy fire and bullet splash, and which, itself, is relatively free from damage.

While, of course, details of arma-

(*Please turn to Page* 170)

FIRE-CONTROL INSTRUMENTS

Analysis of a

Barr & Stroud Rangefinder

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
And
Contributing Editor, STEEL

This Is Number 29 in a Series on Ordnance and Its Manufacture, Prepared for STEEL *by Professor Macconochie.*

■ DETAILS of a Barr & Stroud, Glasgow, rangefinder designed for naval and fortress work are shown on accompanying pages of illustrations. Broadly, we have an inner tube carrying the objectives and deflecting and eye-piece prisms. This is mounted within an outer protecting tube which forms the main frame of the instrument and carries the pentagonal reflecting prisms at the ends. At the ends of this main tube are the pentagonal castings having openings fitted with optically flat glass windows, made of a specially hard glass designed to resist scratching during cleaning. See outer views at top, Figs. 34 and 35.

The main tube itself is formed of a number of drawn brass tubes, reinforced by bronze castings and so assembled that for the greater part of the length of the instrument these tubes form a double envelope with an air space provided between the inner and outer shells.

These tubes are soldered and pinned to the connecting castings. Joints are arranged so those in the inner tube do not come opposite those in the outer. See cross sections, Figs. 36 and 37.

The end pentagonals, solid blocks of optical glass, have proved difficult to hold successfully. Contrary to popular belief, glass is sensitive to pressure and cannot be too rigidly encased. Nor on the other hand must the pentagonal be so loosely held that a jolt will shake it out of adjustment. Thin layers of cork placed above and below the prism have been found effective as cushions between the glass and its enclosing metal framework. This metal framework, see extreme left Figs. 36 and 37, rests on a 3-point suspension, held down by a strong central spring and locked in position after final adjustment.

The gun-metal casting which carries the pentagonal holder has a slightly conical form terminating in a center which engages with a seat in the cap screwed onto the enlarged end of the rangefinder tube. This end cap, as it is screwed on, forces the pentagonal carrier into its seat, a V-notch and feather key being provided to locate the carrier in its exact position. How important this particular adjustment is may be understood by observing that this arrangement really determines the base length of the instrument, a constant which must not change without a corresponding change being made in the range scale.

The rotatable cover rings mounted on the enlarged ends of the tube carry short cylindrical sun protectors or shades, as they are usually called. When the instrument is not in use, these rings may be rotated until the windows which admit light to the pentagonals are closed, protecting them against possible injury. Speaking of protection, note that not only are the end pentagonals surrounded by a generous air space, but the entire instrument is insulated, as far as practical, in the same manner by concentric tube construction. Still air is a remarkably efficient nonconductor of heat.

What we try to avoid in rangefinder operation is not so much temperature changes, over which we cannot in the nature of things exercise any degree of control; but temperature *variations* which would tend to set up mechanical stresses and possibly bring about changes in the relations of the optical parts of sufficient magnitude to affect the accuracy of the instrument. The optical parts themselves are quite

The next two pages present details to scale of a Barr & Stroud (English) rangefinder and mountings as designed and built for naval and fortress work. Note tube-within-a-tube construction and other features described in accompanying text

FIGS. 34 TO 49.—NAVAL AND FORTRESS RANGEFINDER AND MOUNTINGS.

Fig. 34.

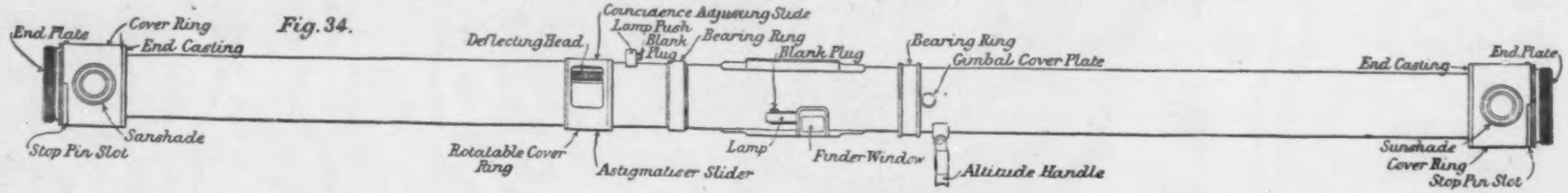


Fig. 35.

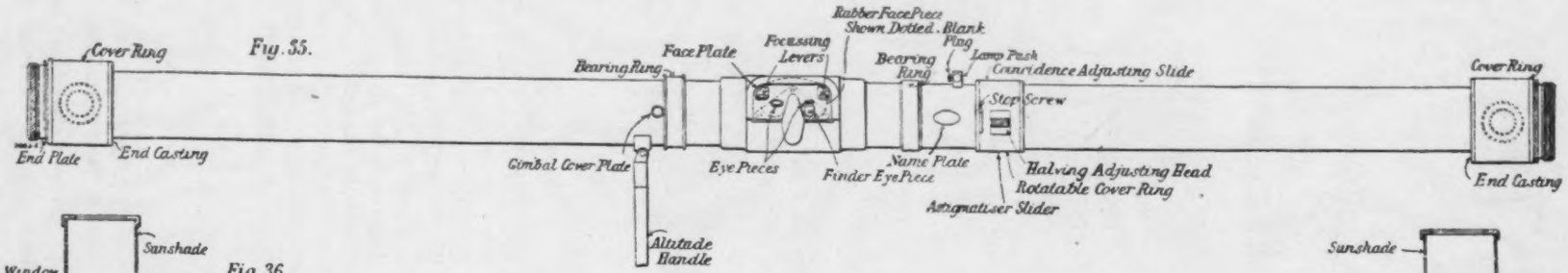


Fig. 36.

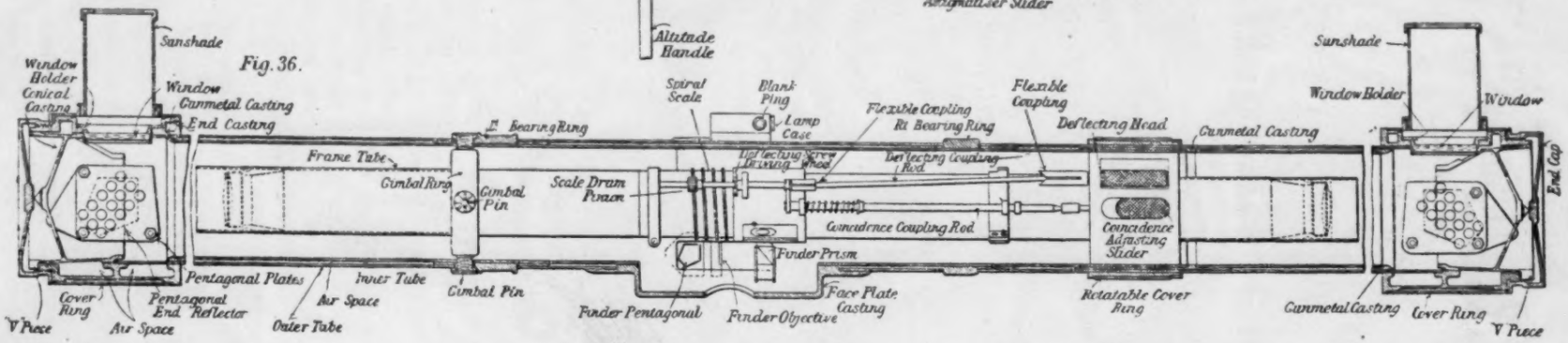


Fig. 37.

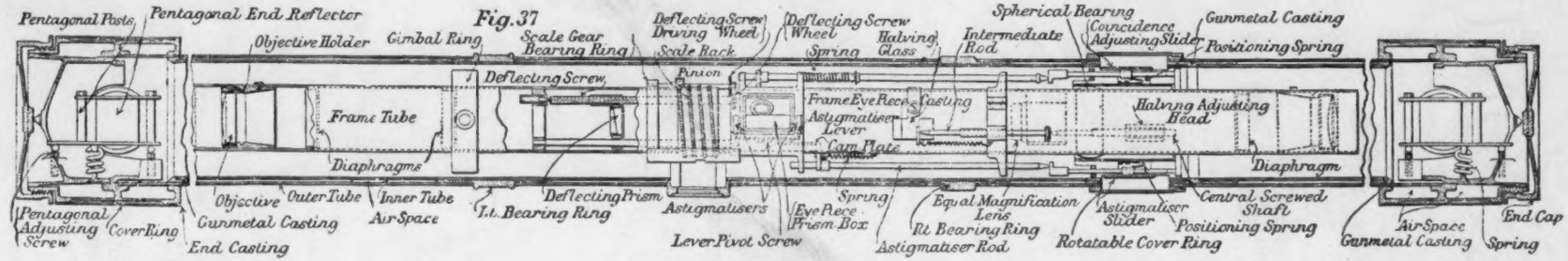


Fig. 38.

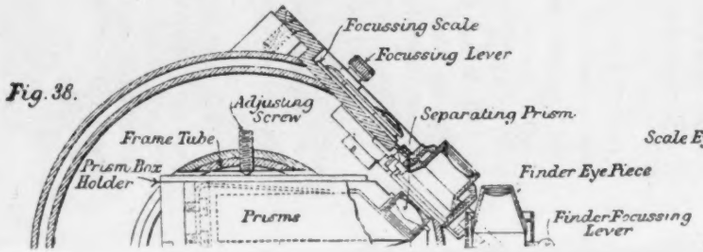


Fig. 39.

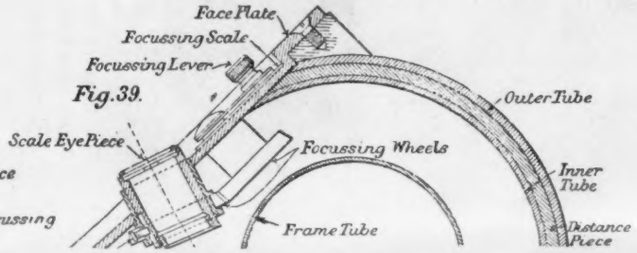
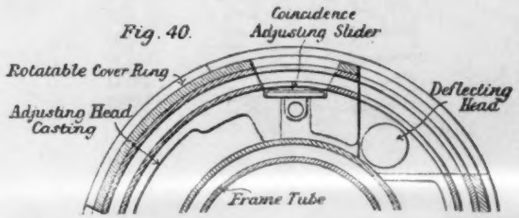
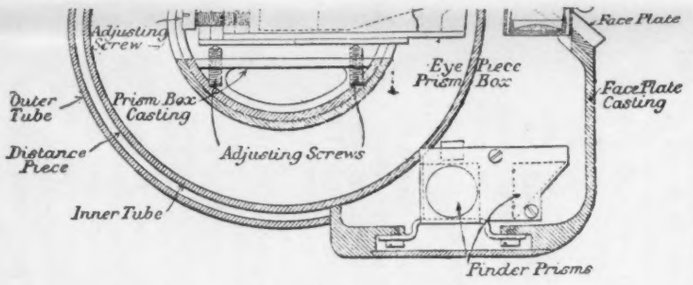
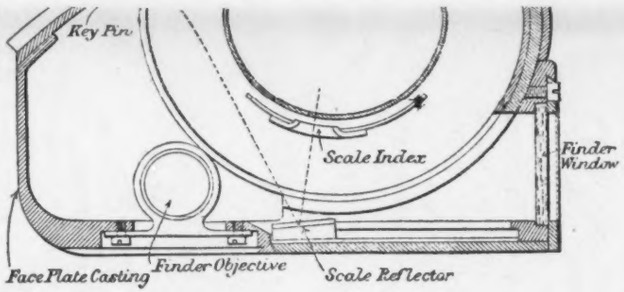


Fig. 40.




Face Plate
Adjusting Screw
Eye Piece Prism Box
Face Plate Casting
Outer Tube
Prism Box Casting
Distance Piece
Adjusting Screws
Inner Tube
Finder Prisms


Key Pin
Scale Index
Finder Window
Face Plate Casting
Finder Objective
Scale Reflector

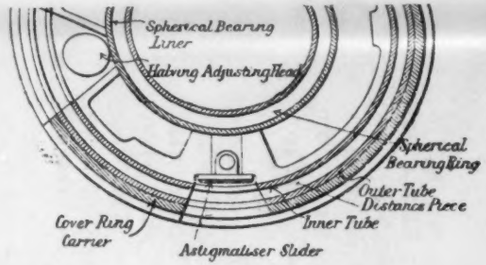

Spherical Bearing Liner
Halving Adjusting Head
Spherical Bearing Ring
Outer Tube
Distance Piece
Inner Tube
Cover Ring Carrier
Astigmatiser Slider

Fig.41.

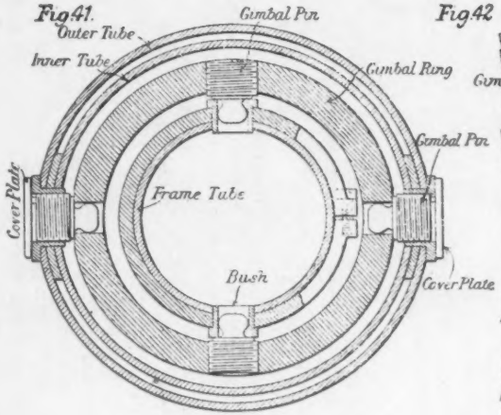
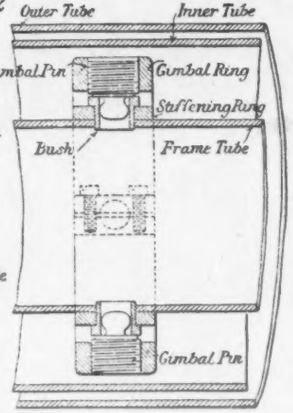
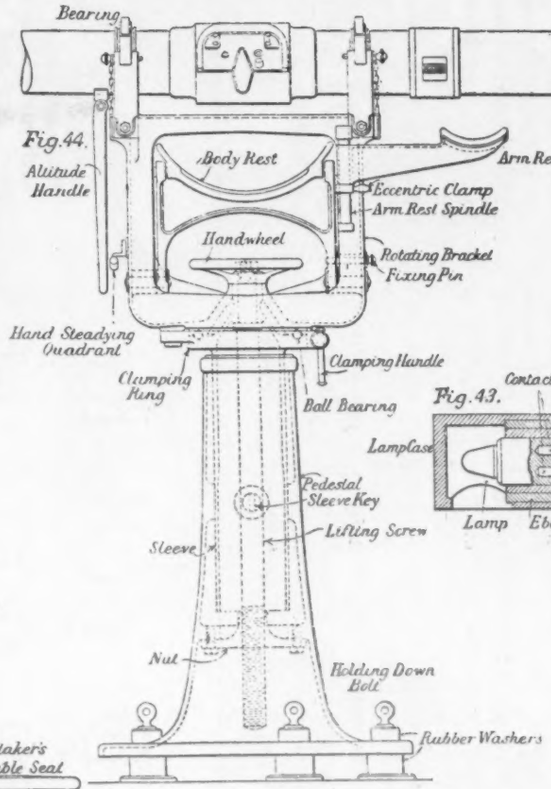

Outer Tube
Gimbal Pin
Inner Tube
Gimbal Ring
Gimbal Pin
Cover Plate
Frame Tube
Bush
Cover Plate

Fig.42


Outer Tube
Inner Tube
Gimbal Pin
Gimbal Ring
Stiffening Ring
Bush
Frame Tube
Gimbal Pin


Bearing
Fig.44.
Body Rest
Arm Rest
Altitude Handle
Eccentric Clamp
Arm Rest Spindle
Handwheel
Rotating Bracket Fixing Pin
Hand Steadying Quadrant
Clamping Handle
Clamping Ring
Ball Bearing
Pedestal
Sleeve Key
Sleeve
Lifting Screw
Nut
Holding Down Bolt
Rubber Washers

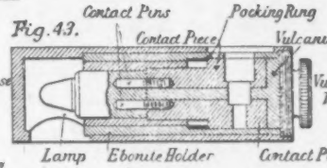


Fig.43.
Contact Pins
Pocking Ring
Contact Piece
Vulcanite Insulator
Lamp Case
Vulcanite Milled Head
Lamp
Ebonite Holder
Contact Piece

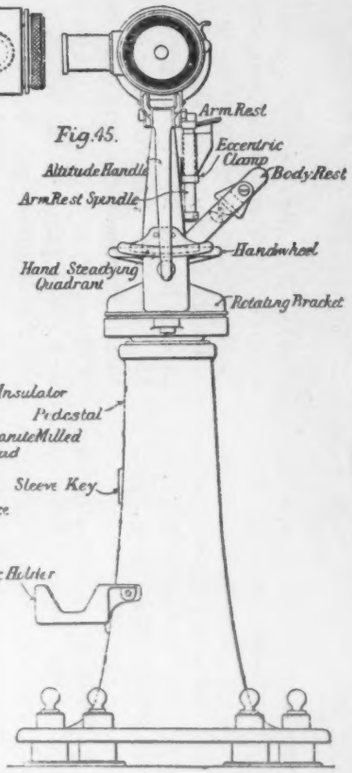
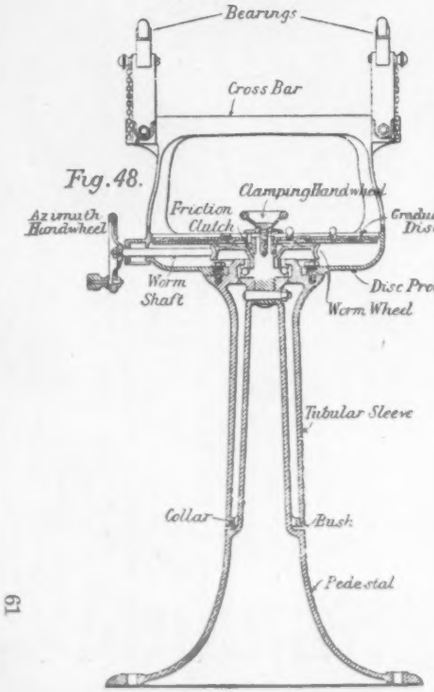
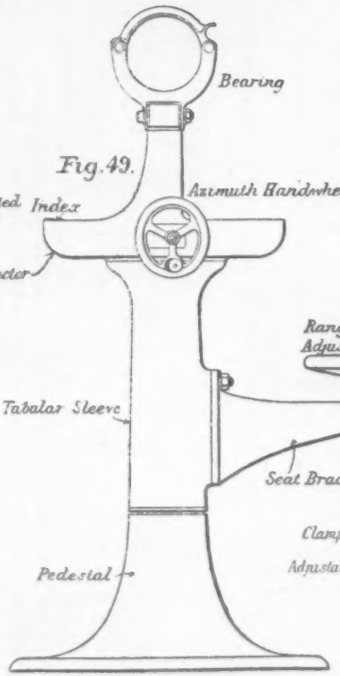
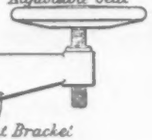


Fig.45.
Arm Rest
Eccentric Clamp
Altitude Handle
Body Rest
Arm Rest Spindle
Handwheel
Hand Steadying Quadrant
Rotating Bracket
Pedestal
Sleeve Key
Battery Box Holder


Bearings
Cross Bar
Fig.48.
Clamping Handwheel
Friction Clutch
Azimuth Handwheel
Graduated Disc
Worm Shaft
Disc Protector
Worm Wheel
Tubular Sleeve
Collar
Bush
Pedestal


Bearing
Fig.49.
Index
Azimuth Handwheel
Tubular Sleeve
Pedestal


Rangetaker's Adjustable Seat
Seat Bracket

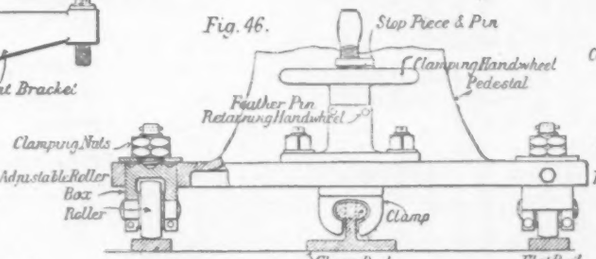


Fig.46.
Stop Piece & Pin
Clamping Handwheel
Pedestal
Feather Pin
Retaining Handwheel
Clamping Nuts
Adjustable Roller Box
Roller
Clamp
Clamp Rail
Flat Rail

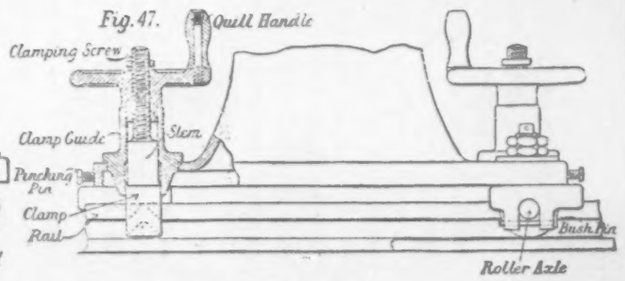


Fig.47.
Quill Handle
Clamping Screw
Clamp Guide
Stem
Pinching Pin
Clamp
Rail
Bush Pin
Roller Axle

sensitive to variations of temperature throughout the mass, such variations if of sufficient severity, sensibly impairing their efficiency. The writer, while testing large end pentagonals between crossed Nicol's prisms for optical homogeneity, has observed the creeping strain caused by placing the warm finger upon the block.

In Figs. 38, 39 and 40, immediately underneath the longitudinal cross sections of the rangefinder, are end cross-sectional views of the central casting, and what is contained therein. This central casting with a face inclined at 45 degrees carries one eyepiece for observing the field of view and another which enables the operator to examine the scale. A third eyepiece for the finder is also seen. Now most of us prefer to see the same object with both eyes, but after a little practice it is surprising how accustomed one becomes to seeing one thing with one eye and quite another with the other.

What is conveyed to the brain are two superposed images whose relative intensity may be controlled by an effort of the will. Thus an expert operator becomes easily able to secure coincidence of the partial images with one eye while the other takes periodic readings of the range. The range scale in this instrument is read with the left eye. To exclude all light except that which comes through the instrument itself, a soft rubber brow pad is provided (not shown here). This also serves to protect the eyes of the observer from cold wind and provides a little added comfort while guns are firing in his neighborhood.

The target finder is so arranged that the observer merely has to look downward and need not remove his face from the protecting rubber pad. The particular arrangements here exhibited include the finder window, which appears at the back of the instrument and away from the observer, a suitable objective, and the necessary prisms required to bring the image of the object to a focus in a horizontal plane where it may be examined by the finder eyepiece. The finder has 4 magnifications and an angular field of 9 degrees, the prism combinations being so arranged that when the object under observation is brought within this circle, we see a highly magnified image in the main field, whose angular field is 1 degree and 28 minutes and magnification 28.

Toward the right of the instrument and conveniently located to the right hand of the observer will be found a cover-ring which may be rotated to any one of three positions to uncover, first, the deflecting prism movement and the arrangements for throwing the astigmatisers into action; next the adjusting heads for the correction of coincidence and halving errors. In the third position, from which as it were, we started, all of these operating parts are covered for protection.

SPEED YOUR PRODUCTION

by checking the important aids to efficiency revealed in this survey

Read how one plant upped output 25 per cent with push-button controls; how another plant saves $6500 yearly in power bills; how contact life was extended from three weeks to over nine months; how a saving of $70 monthly is being obtained with an investment of only $600. Tool life is extended 75 per cent

By FRED MERISH

■ TODAY with equipment hard to get, it isn't always feasible to expand plant facilities as fast as may be desired. Thus it becomes increasingly important to utilize processing boosters of one kind or another to increase plant outputs. To determine at first hand what steel mills and metalworking plants are using to help existing machines increase production, we made a survey for STEEL and report these findings.

Controls appear first on the list of production builder-uppers. Our survey work sheets show that more than 40 per cent of the plants reviewed bought additional processing and electrical control equipment during the past year or replaced old units with new. In some plants, such new equipment stepped up production as much as 50 per cent, reducing the cost of operations involved correspondingly, whether used to control the movement of stock from the scale car to the furnace; to prevent mistakes in furnace charging; to stand guard over motors; to balance operations by coordinating the regulation of such variables as pressure, temperature, flow and liquid levels; or to increase the strength of welds.

In one plant, a double-roll feed on a press for blanking and forming is used to level and straighten the metal before it goes to the dies. Production was passable until the speed-up for defense went into action. Then this press "bottlenecked" production. An obsolete system of control was the cause. After installing modern controls operating from a push-button station, production increased 25 per cent because it went along uninterrupted. No more "bottlenecks".

Similar conditions were found in many plants. Under normal operation, the existing equipment had been able to take production in its stride but as capacity was strained, the "bugs" began to show. As in this case, modern controls did the exterminating. In another plant, modern push-button control permitted simpler and more convenient handling of a variety of riveting and press-assembly operations. In one shop, variations in hoist speeds were obtained with push-button control, giving the materials-handling operations that change of pace needed

(*Please turn to Page* 182)

It's hard to say "No" to a friend...

WE at Revere have always felt that we have, not "customers", but friends. Certainly, this has been our way of looking at it, because we have thought of your order not only as so many pounds or tons of metal—but as a valuable opportunity for us to make you feel glad you came to Revere for copper or copper alloys.

That's why we haven't had much use for the word "No"—up to the time of priorities and preference ratings. But Uncle Sam has the final word in this emergency, and now we sometimes find ourselves unable to oblige even our oldest and best friends.

Revere Technical Advisory Service will, however, continue to work closely with you, bringing to bear on your problems all of Revere's extensive knowledge of materials. In some cases we have been able to guide our customers into Defense contracts in which priorities work for them instead of tying their hands. So get in touch with Revere—together we may find a way of changing "No" to "Yes".

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Design and Construction of

BASIC OPEN-HEARTH ROOFS

By LEWIS B. LINDEMUTH
Consulting Engineer
New York

■ DEVELOPMENT of the basic roof for open-hearth furnaces has extended over at least the last seven years, five of which have seen successful application in Europe and since 1937, in England and an experimental installation in Australia. Two major considerations and several minor ones have made it possible to construct a basic arch of open-hearth roof size which permit it to stand up under stresses and high temperature. The first is that a better brick has been developed for this purpose. It is chrome-magnesite brick containing 60 per cent or more of chrome ore and made from carefully selected raw materials accurately screened to size, formed at high pressure and burned at high temperature.

The second factor is the method of supporting the roof with the provision for expansion and contraction. Minor considerations are accuracy in laying bricks, use of metal liners between bricks and use of key bricks instead of wedges.

Roofs: The bricks are all keys, instead of the usual wedge shape for silica and ribs are made up of two rings. Ribs are spaced from 4 to 6 bricks apart. Joints of each adjacent ring are bonded by the use in every alternate ring, of 1½ width bricks next to the skewback. Metal liners of 20-gage black iron are used between all of the joints. Usual rise of 1.5 to 1.6 inches per foot of span is desirable. It is important that distance from transverse centerline of the furnace to the knuckles is accurate at all four points otherwise the rings cannot be straight across and extra strains are put on the bricks in certain areas.

Bricklaying is started at the center of the furnace and any irregularity in binding of the skewback channels is taken up at the ends of the furnace over the uptakes. Keying of the arches is done at three points and the keys should drive easily. The most novel features of the roof are that it is held down to its original cold shape by a rigid superstructure and the expansion and rotation of the skewback are taken care of by suspending the skewback supports from the superstructure and holding the back skewback support away from the buckstays by means of heavy volute springs outside of the buckstays.

Between the buckstays there is a metal form, which extends from the skewback support to the outside of the buckstays and has a loose fit between the buckstays. This form transmits the tension from the spring to the skewback support.

This is a volute spring of five coils, 9 inches outside diameter at the base and 2¾ inches inside diameter at the top. It is made from 6 x ⅝-inch spring steel. About 35,000 pounds are required to close the spring. Size, however, depends on the weight of the roof and spacing of the springs.

In cases where the buckstay arrangement is such that a fairly uniform spring loading could not be obtained, cross members can be fastened between buckstays and the springs uniformly located along these. This arrangement is made for a tilting furnace where the buckstay spacing and arrangement would not otherwise permit springs.

Across each rib of the roof is placed a 5 or 6-inch channel, bent to a radius of the ribs where the roof is cold. Running longitudinally to the furnace and resting on the channels are five 6-inch I-beams. There are pieces of plate welded to the channels to prevent the I-beams from slipping. The beams are spaced to give approximately uniform pressure on the channels.

Across the furnace and fastened to the cross ties or buckstays is a plate construction, the lower side of which is cut to the curvature of the roof and located about 9 inches above the ribs. On the bottom of this ½-inch plate is fastened a 5 x 5 x ½-inch angle which is tapped for 1-inch diameter hold-down bolts located so they will turn down on the longitudinal I-beams. This provides a hold-down arrangement for the roof.

To provide for the free movement of the back skewback during operation of the furnace, it is essential that the expansion of the walls upward will not cause them to come in contact with the skewbacks. Ample provision for this expansion is made in laying the walls and the open space between the walls and skewback is filled with loose magnesite or chrome ore which will crush out during the heating up stage.

STARTING THE FURNACE. When the roof is laid, all hold-down bolts are loosened. The nuts on the ends of the spring bolts are tightened until the wooden spacing blocks between the buckstays and back skewback support are loose. The blocks then are removed and the entire thrust of the roof is on the springs.

During the heating up operation which is the same for silica roofs, the crown of the roof is not permitted to rise more than 1-inch. No rise is more desirable. When there is a rising tendency noticed the nut on the spring bolt is loosened about ½-turn. It takes an hour or more for this to be effective.

When the furnace is up to temperature, the hold-down bolts then are turned down to a hand tight contact with the longitudinal I-beams on the roof. No further attention to the springs or bolts is necessary until the furnace comes off for repairs. At this time the reverse procedure takes place except that the hold-down bolts are not touched. Any tendency of the roof to sag during the cooling is taken care of by tightening the spring bolts.

Mortar: One consieration which should apply to basic brick used everywhere, is that no free water should be used in the mortar and joints should be thin. For new work, 100 parts of magnesite mixed with about 20 parts of oil produce a good mortar. Any kind of oil such as linseed, cottonseed, waste lubricating oil, etc., will be satisfactory. For hot work a mortar from about 3 gallons of waterglass (specific gravity 1.16) per 100 pounds of ground magnesite is satisfactory; but the temperature of the furnace must be high enough to immediately volutalize the water added to the waterglass. A magnesium sulphate solution mixed with ground magnesite is also satisfactory mortar for temperatures where the moisture is quickly driven off.

ECONOMICS. Economics of basic construction depend upon the place. The greatest cost saving comes from those items of "cost above" which are inversely proportional to the tonnage such as labor, fuel, overhead, etc. Brickwork and repair labor will show substantial reduc-

(*Please turn to Page* 186)

This article is from a paper presented at the autumn meeting of the American Ceramic Society, refractories division, Granville, O., Sept. 5-6.

Cutting test disks of stock for anti-aircraft gun barrels.

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MO-MAX is the original commercial "MOLY" high speed steel. Thousands of tons have been made to produce millions of the highest quality high speed tools. Its years of commercial experience demonstrate that it is a uniform and reliable all-purpose high speed steel.

It has been developed in the cobalt types for those who require cobalt high speed steel.

It is standardized both as to composition and manufacture. This is important to those who buy from several sources of supply. They are assured of getting the same composition which will respond to the same heat treatments.

The following general purpose analysis has been in production for many years and is standard with twelve of the principal steel mills:

Carbon, .80 Molybdenum, 8.50 Tungsten, 1.50
Chromium, 4.00 Vanadium, 1.00

Play safe and specify MO-MAX. Leading steel companies have been licensed to produce their own brands of MO-MAX under patents owned by The Cleveland Twist Drill Company.

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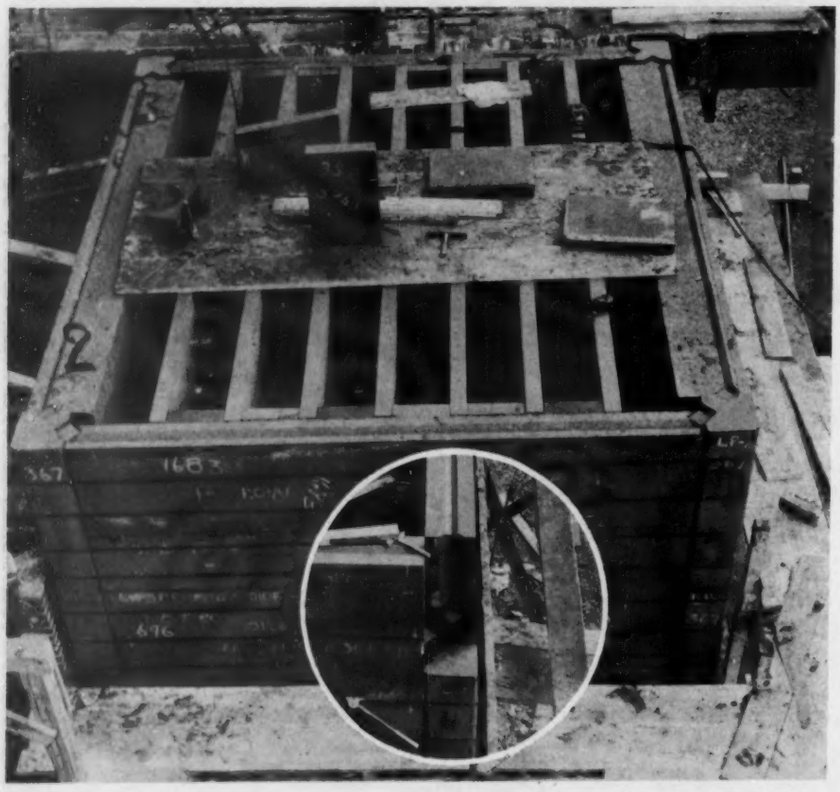
USE of CARBON and GRAPHITE

Improves Operations and Maintenance

Carbon and graphite are most unusual materials and the author herein describes in a brief way their manufacture and discusses some of their applications in the iron and steel industry in the light of better operating conditions and reduced maintenance cost

By FRANK J. VOSBURGH
Manager, New Products Division
National Carbon Co. Inc.
New York

■ CARBON, other than a constituent of metal, first came to the attention of the iron and steel industry as a graphite crucible, and history reveals that these crucibles were known and used hundreds of years ago. The next mention of carbon in the industry, and its first use as a material for construction, was as the hearth of a reverberatory furnace for making ferromanganese, about 1865, in England. Twenty years or so later *Stahl und Eisen* reported on the first blast furnace having a carbon-lined hearth section. As time passed the electric steelmaking furnace was invented, carbide and ferroalloy furnaces



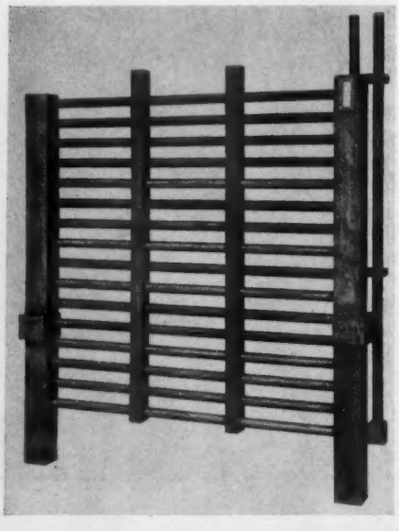
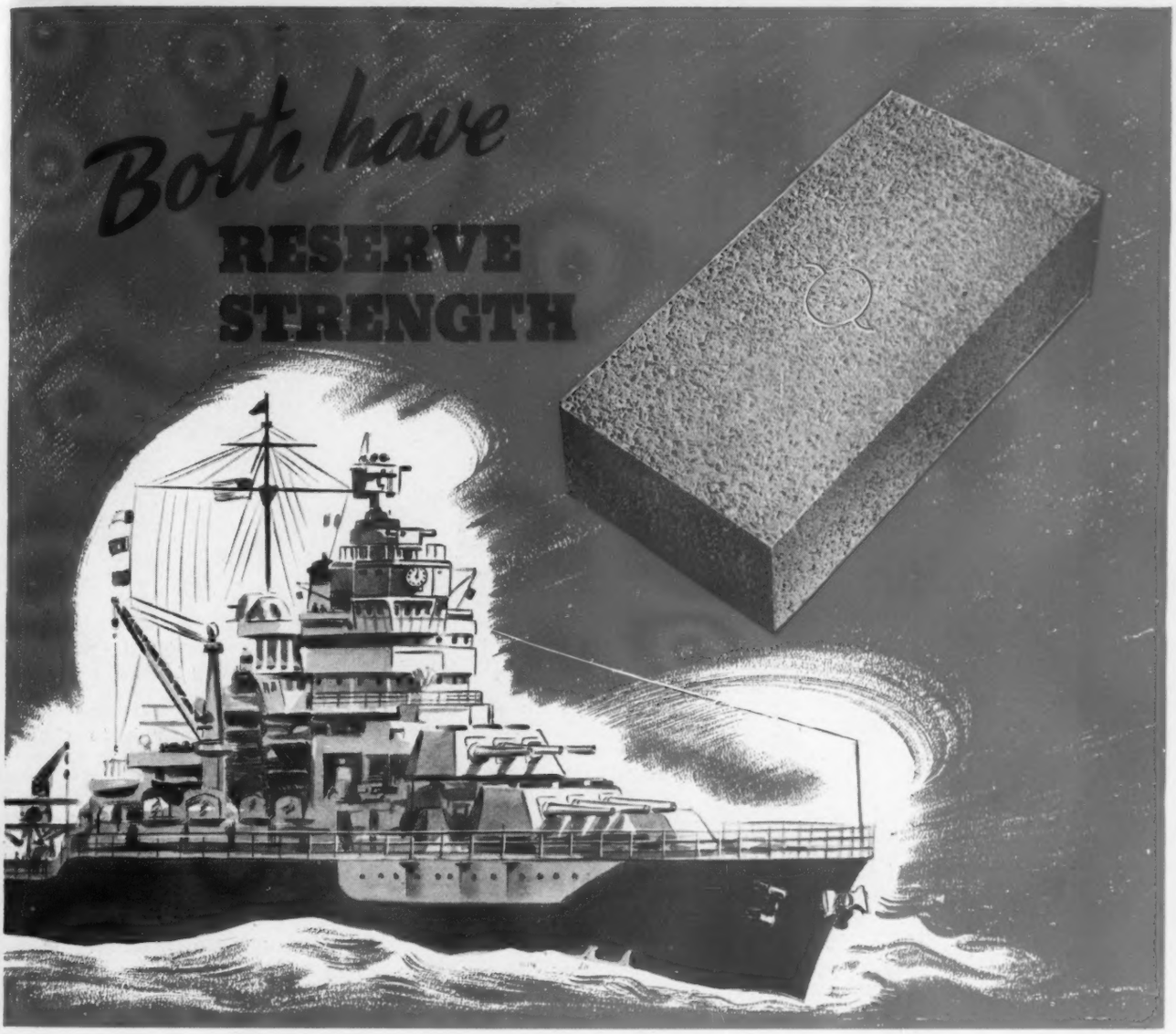


Fig. 1—All carbon electrostatic precipitator: Supporting beams for tube sheets are quickly installed. Fig. 2 (Inset)—Wall blocks are keyed together vertically and horizontally. Note corner construction in view at left
Fig. 3 (Directly below)—Series of coils for cooling and heating a pickling tank
Fig. 4—Split carbon ingot mold for casting alloy steel ingots. Ceramic inclusions are not introduced into the ingot. Note lower left illustration



. . . and both come through with flying colors when the fire is hot!

The effective strength of B&W Insulating Firebrick proves itself under actual service conditions. They withstand heavy loads and high stresses without deformation.

Strong, yet extremely light in weight, B&W Insulating Firebrick possess excellent thermal characteristics; give long and satisfactory service under severe service conditions.

Details are given in Bulletin R-2-G, which will be gladly sent upon request.

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R-159

BABCOCK & WILCOX

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PHYSICAL CHARACTERISTICS OF CARBON & GRAPHITE PRODUCTS†

	Carbon	Graphite	Karbate No. 1	Karbate No. 2	Carbocell	Graphicell
Apparent density	1.55	1.55	1.77	1.86	1.04	1.04
Weight, lbs./cu. ft.	96.7	96.7	110.0	116.0	69.0	69.0
Strength, lbs./sq. in.						
Tensile	400-800	600-700	17-2000	23-2600	80-190	50-110
Compressive	19-4100	30-3400	10500	89-10500	160-600	140-250
Transverse	8-1600	15-1800	42-4600	46-4900	300-850	270-500
Specific Resistance,						
Ohms per cu. in. ..	0.0018	0.0004	0.0016	0.0034	0.0070	0.0012-0.0020
Coefficient thermal						
expansion K*	15	5-12	27-33	23	27	21
Thermal conductivity,						
Btu/hr./sq. ft/°F/ft.	4.0	80-94	3.0	75-85	1-1.5	20-50

†Characteristics vary with size. Figures are averages.

*Coefficient Thermal Expansion to Temperature t° Fahr. = $[K + .003 (t° Fahr.)]^{10^{-7}}$ to temperature t° Cent. = $[1.8K + .007 (t° Cent.)]^{10^{-7}}$

were built, so that as electrodes and linings of such furnaces, carbon and its more or less twin brother graphite, assumed an important place in the industry. The first carbide furnace back in the nineties was lined with electrode butts, 4 x 4 x 40 inches and that was the largest size electrode available. Today, furnace liner blocks are available in sizes 40 inches diameter and 100 inches long, or in rectangular shapes in a variety of sizes up to 24 x 30 x 180 inches.

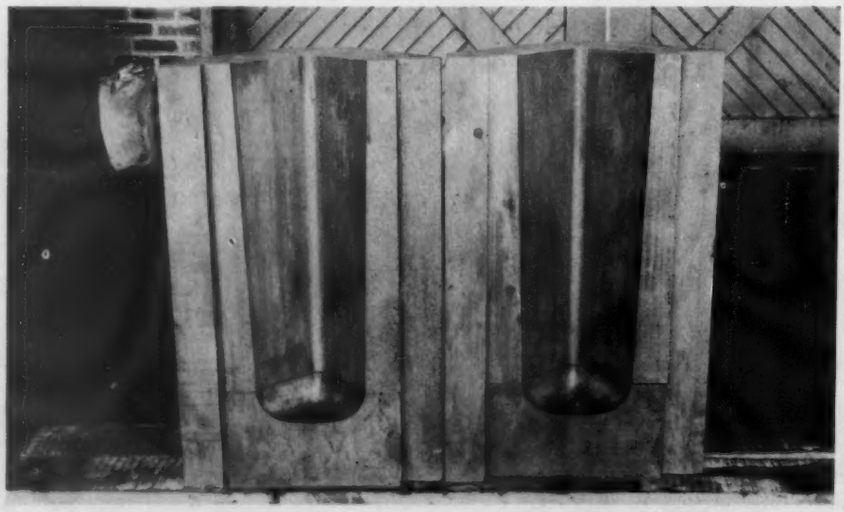
Large Electrodes Not Available

Dr. James A. Mathews, in reporting in 1927 on the operation of the first electric steel furnace in 1905, commented on the fact that at that time the Halcomb Steel Co. could not buy in the United States the carbon electrodes it needed, which were 14 inches square. At present electrodes may be purchased in sizes up to 40 inches diameter and 100 inches long, and rectangular shapes up to and including 24 x 30 x 180 inches. For some time the Halcomb Co. made its own or imported them from Germany. At the same time Dr. Mathews commented on the quality of both types and mentioned that he had seen carbon electrode costs per ton of steel drop from $8.00 to less than $1.00 per ton melted.

Carbon and graphite are similar in several respects and definitely different in others, as reference to the accompanying table of physical characteristics indicates. Both are highly manufactured materials normally taking from 8 to 12 weeks to produce from the raw materials. Carbon articles, electrodes, brushes, projectors, bricks and blocks are made from a variety of materials of which the usual ones are anthracite coal and petroleum coke. Graphite articles are largely made from petroleum coke.

The raw materials are calcined at high temperature to drive off all volatile constituents, and in the making of carbon electrodes for electric furnace use, the anthracite coal is treated in electric furnaces at a temperature high enough to change some of the carbon of the coal into graphite thus increasing its electrical conductivity. After calcination the proper proportion of coarse and fine particles are mixed with an exact amount of pitch in steam heated mixtures until thoroughly blended.

Fig. 5—Graphite ingot mold which possesses all the advantages of the carbon mold also affords fine surfaces on the ingot. The ingots strip clean and the molds can be kept in regular service indefinitely



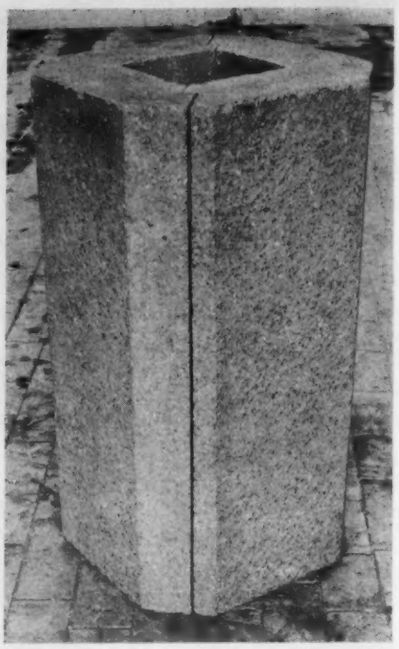


Fig. 6—Split carbon mold assembled. Hot metals do not stick to this type mold, hence coating is unnecessary

Extruded To Desired Shape

From the mixers the plastic mass goes to the extrusion presses or "Jumbos" where it is squeezed out through dies in the form desired, cylinders, tubes, squares, and plates. The next step is the baking. Since the formed "green" material will become plastic again during the baking process, each article no matter how small or how large, must be completely supported to prevent change of shape, and at the same time separated from its neighbor on each side so the several pieces will not flow together. During baking the volatile part of the pitch is driven off; the packing material must have an open structure to let the fumes get away, and so graded mixtures of coke are used for the purpose. Baking is a long process for the furnace temperature must be raised slowly and evenly until it reaches 1000 degrees Cent., or in some cases even higher temperatures, and the cooling schedule is equally slow.

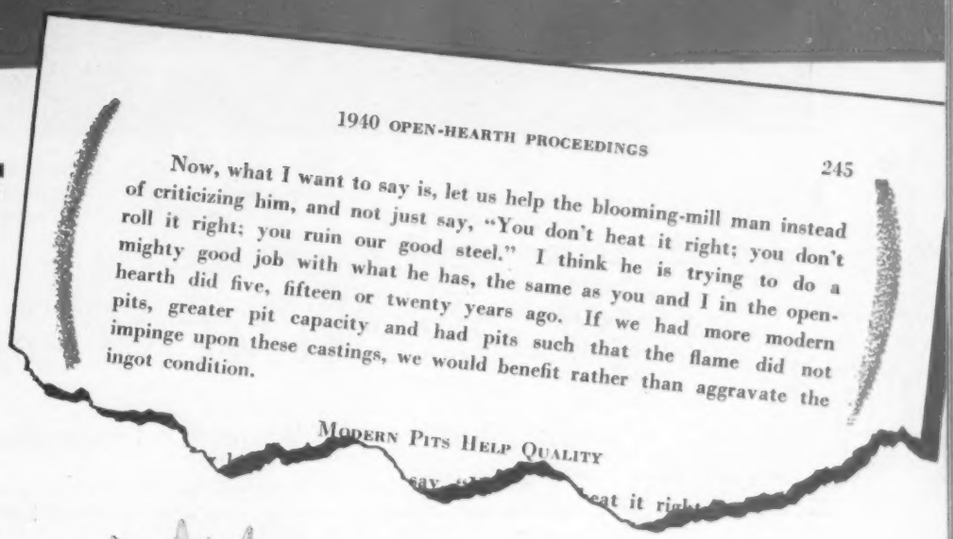
After baking the articles are cleaned to remove the sticking coke, and are then ready for shipment, or in the case of electrodes, for the threading operation which makes

(*Please turn to Page* 176)

LOOK TO YOUR PITS...

IT ISN'T ALWAYS THE BLOOMING-MILL MAN! OLD, OBSOLETE SOAKING PITS MAY BE RESPONSIBLE FOR HIGH CHIPPING COSTS AND REJECTS

READ THIS EXCERPT FROM A STATEMENT BY A WELL-KNOWN STEEL MILL OPERATOR...SOUND ADVICE ON OBSOLETE PIT DANGERS



1940 OPEN-HEARTH PROCEEDINGS 245

Now, what I want to say is, let us help the blooming-mill man instead of criticizing him, and not just say, "You don't heat it right; you don't roll it right; you ruin our good steel." I think he is trying to do a mighty good job with what he has, the same as you and I in the open-hearth did five, fifteen or twenty years ago. If we had more modern pits, greater pit capacity and had pits such that the flame did not impinge upon these castings, we would benefit rather than aggravate the ingot condition.

MODERN PITS HELP QUALITY

● If you are having trouble rolling your ingots . . . if you are experiencing excessive rejects, bottom making, or conditions costs—look to your pits! In many instances an investigation has shown that the pits themselves were the cause . . . that the blooming-mill man was doing a mighty fine job with the pits available.

Without soaking pits of the proper design, it is next to impossible for the heater—and therefore, the roller—to do a consistent satisfactory job. Given pits of sufficient capacity and the proper design, the heater can control many of the factors which effect surface quality so that the amount of conditioning and rejects is kept to a minimum.

Into SC One-Way Fired Pits have been incorporated every factor to protect a good heat and, where possible, to save an abnormal heat. All combustion takes place in the pit above the ingots, eliminating entirely the possibility of flame impingement. The design further permits the resultant products of combustion, in their path to the waste gas port located beneath the firing port, to envelope all the ingots. Because in SC Pits *all* of the products of combustion are passed over *all* the charge being directly heated, the control adjustment remains the same for a hot or cold, light or heavy charge. Any fuel, including straight blast furnace gas, can be used in SC Pits.

Recent improvements have made it possible to construct SC Pits with larger holes. In one of the Battery of pits, now on order, the size of the holes has been increased to 23'-4" long by 6'-8" wide by 10'-8" deep to accommodate eight ingots 20"x57"x78" per hole. Other outstanding features now available on SC Pits include automatic program control of temperature for initial and final ingot heating and automatic variable pressure control to conform with fuel input.

SECURITY FOR AMERICA
SC FURNACES FOR NATIONAL DEFENSE

SURFACE COMBUSTION CORPORATION • TOLEDO, OHIO

WHEREVER HEAT IS USED IN INDUSTRY

SURFACE SC COMBUSTION

35 YEARS

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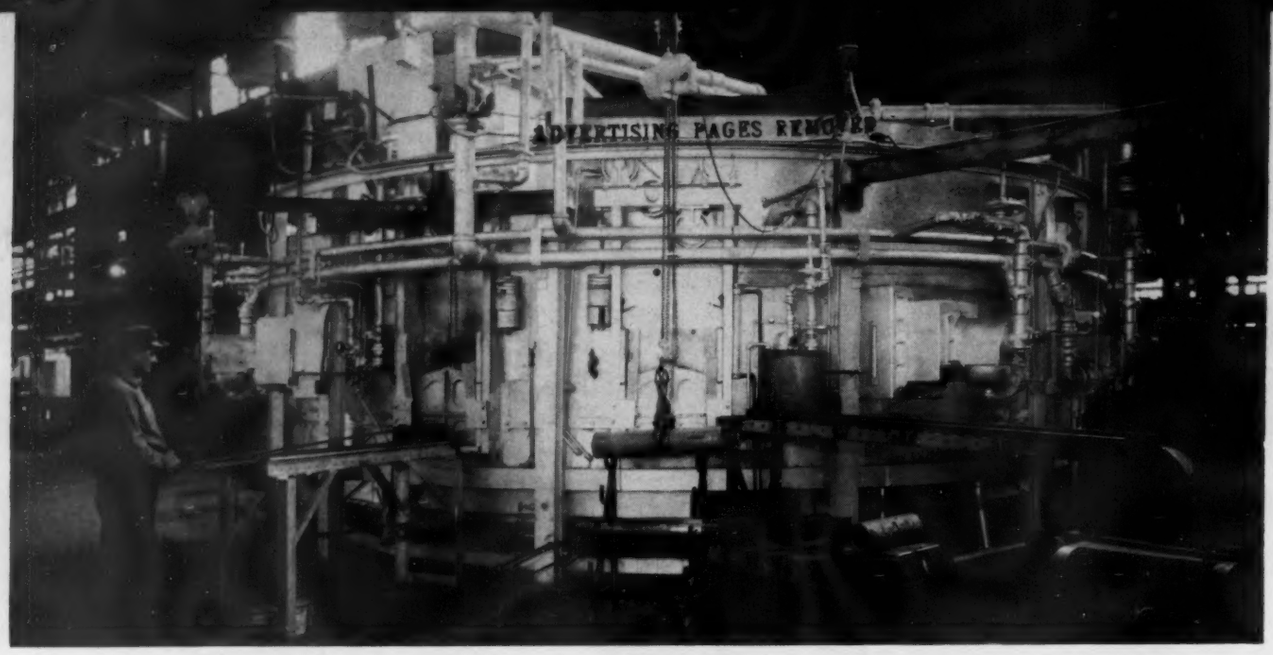


Fig. 2—Action view of same furnace as shown in Fig. 1: Here operator is charging 138-pound billets for 155-millimeter projectiles. Note hoists, grabs, feed and discharge rails to facilitate handling work into and out of the furnace

The Heating and HEAT TREATMENT of ORDNANCE

Section I—Forging, Nosing and Tapering Projectiles

In this, first of a series, a prominent furnace manufacturer begins a description of the practices and equipment best suited for various types of heating and heat-treating operations incident to ordnance work

By W. M. HEPBURN
Vice President in Charge of Engineering
Surface Combustion Corp.
Toledo, O.

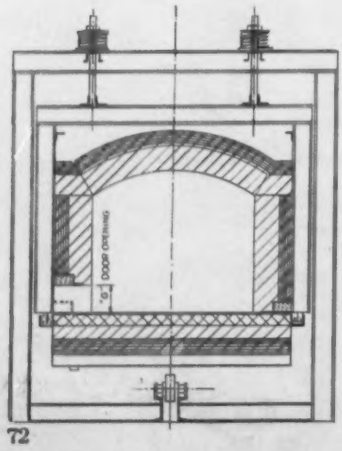
■ THE DEFENSE program calls for heating a great variety of metals in large quantities. As a rule, the operations involved fall within the usual procedures and embrace the well-known methods of forging, hardening, tempering and stress relieving as well as case hardening and other specialized processes. Consequently, a review of this field will involve, in reality, a review of the whole heating and heat-treating art. However, the rapid progress in this field in recent years has been brought to a head by the events of the last few months which have made it desirable to appraise existing forms of equipment to best utilize cumulative experience and to provide equipment best suited to handle present requirements.

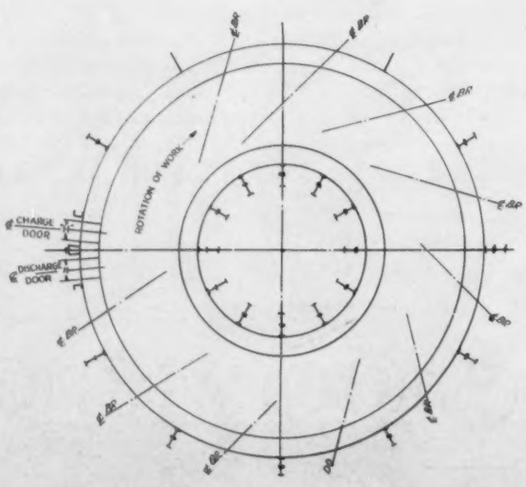
Some equipment being built today had its inception in 1914-18 and still finds a place along with structures of more recent design. Too, there are units which employ special firing and heating methods, such as variable-flame burners and radiant-tube elements, along with furnaces of special design which make use of a variety of specialized atmospheres. Furnaces which depend for heating upon the rapid circulation of hot gases—so-called

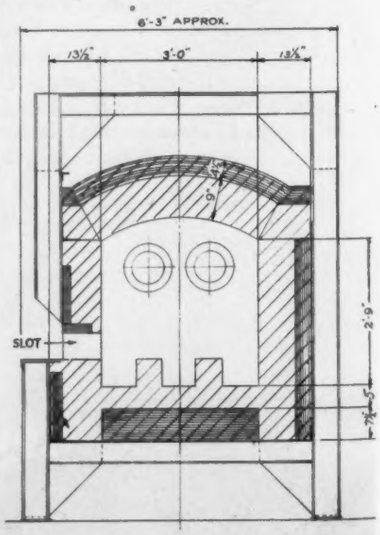
(*Please turn to Page* 84)

Fig. 1—Rotary hearth or "doughnut" forging furnace, lower left, in plan and cross section. Location of the variable-flame tangential gas burners is shown in plan view. Unit heats 9000 pounds of billets to 2200 degrees Fahr. per hour for forging into projectiles

Fig. 3—Batch furnace, lower right, of the slot type: Working chamber is 3 feet deep, 14 feet wide. Slot through which work is inserted is 11 feet wide. Furnace is heated by combination oil and gas burners







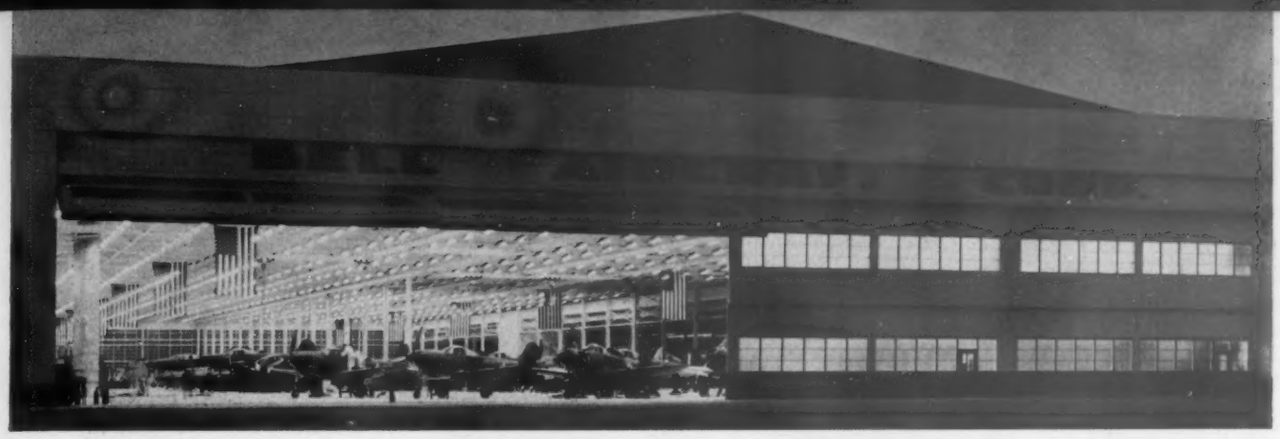


Fig. 1—End of Airacobra production lines terminates opposite huge doors which open directly onto landing field apron. Note high-bay fluorescent lamps that flood interior with light

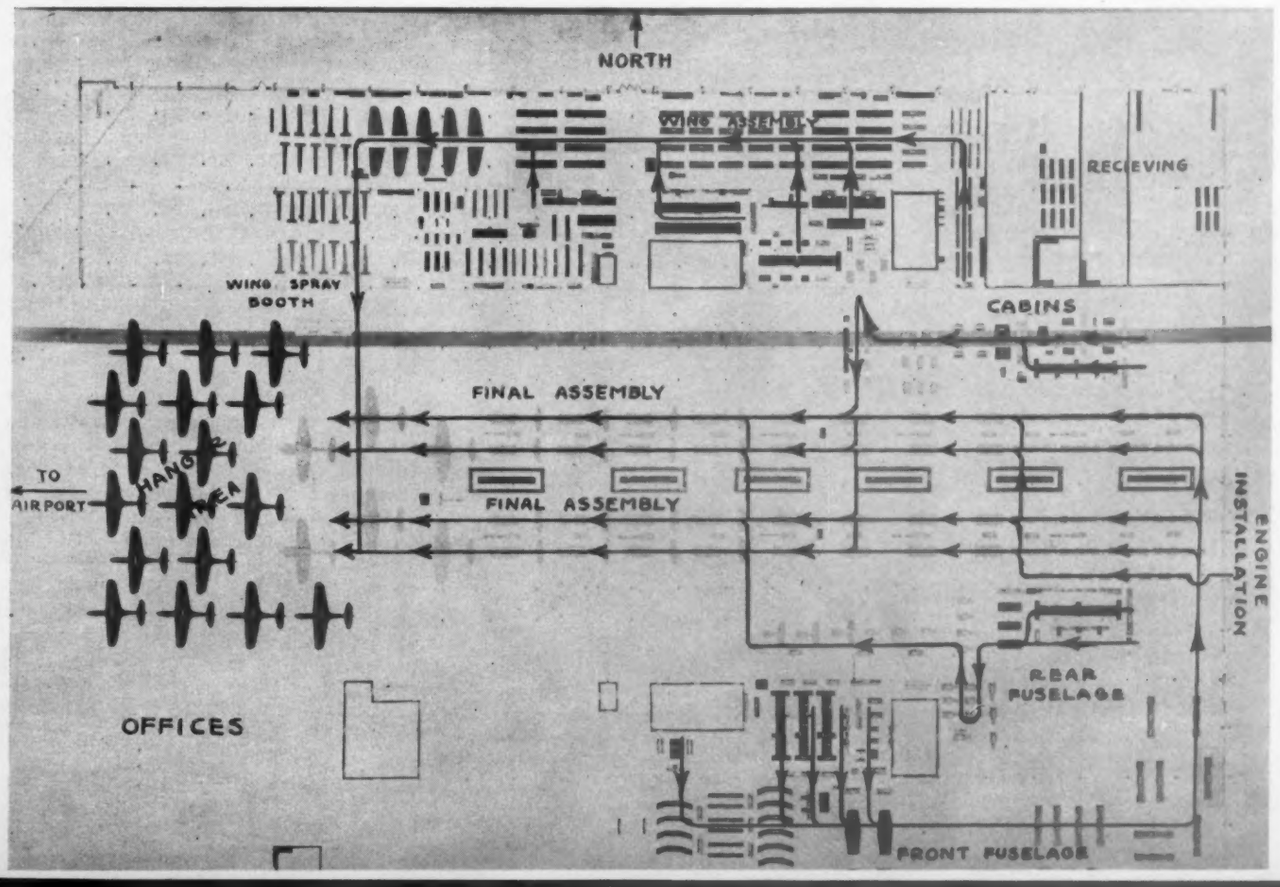
NEW WARPLANE PLANT

. . . . . is designed around conveyorized layout. Efficient materials handling system is based on automotive-type constantly moving assembly line, served by overhead monorail system

■ AT THE new Niagara Falls plant of Bell Aircraft Corp. is one of the aviation industry's first conceptions of a constantly moving assembly line for making aircraft. While only in operation a few months and not yet running at capacity, it already has proved so satisfactory that the Defense Plant Corp. has authorized an $8,456,175 project to more than triple production space. The present plant, with 240,000 square feet, will be increased by an additional 555,000 square feet of space which will include mezzanine floors in the existing structure and a large basement.

As is well known, the mass production of warplanes cannot be compared to the mass production of automobiles for a number of reasons. First, designs are not standardized for a year as in the automotive industry because military equipment must be kept up-to-date. Second, whereas cost is the primary factor in automotive design, it is secondary to lightness, speed, fire power, maneuverability and other considerations in warplane design. Thus before mass production of warplanes can be undertaken, manufacturing equipment and production methods must be perfected which will accommodate sudden changes in design without seriously interfer-

Fig. 2—Floor plan showing arrangement of departments feeding the main assembly lines which extend from east to west throughout the center bay. Cabins, rear fuselage sections and wings feed into the main line by overhead monorail system



ADVERTISING PAGES REMOVED

Fig. 3—Overall view down one of the main assembly lines. Starting with front fuselage in far rear, plane travels forward from station to station in progressive assembly system. Note parts bins alongside each of the 14 assembly stations

Fig. 4—Closeup of portion of assembly line showing chain conveyor flush with floor. Note hinged hand-hook device which connects movable jig to drag conveyor. Movable jig has individual electric power and air distribution system which is connected to plant facilities through floor outlets spaced at 15-foot intervals down the line. Hi-cycle power also is handled in same manner. This obviates necessity of disconnecting and reconnecting each of the power driven hand tools as the jib travels down the line from station to station

ing with the smooth flow of materials through the assembly line.

For some months, production of Airacobras for the United States Army Air Corps has been gaining rapid momentum at the Niagara Falls, N. Y., plant of Bell Aircraft Corp. Already four assembly lines have been laid out and provisions have been made to increase this to six in the present building. As previously mentioned, these facilities already have proved so satisfactory that plant space is being more than tripled to accommodate increased output.

Plane Design Aids Greatly

Before the assembly lines for the Airacobra could be laid out, it was necessary to have a plane design which would eliminate as much as possible the use of the innumerable heavy and expensive jigs which would complicate a smooth flowing conveyorized assembly layout, yet which were required by conventional manufacturing methods. This meant the warplane itself must be designed for this type of assembly—which it is.

As seen in Fig. 3, each of the four assembly lines here involves a straight-line series of operations which extend two-thirds the length of the building. In the remaining area, wing assembly and final adjustments are made. See Fig. 2.

Although most of the 9000 parts entering into the Airacobra come from the Bell plant at Buffalo, a large number of riveting and subassembly operations are being handled in the new plant. For details on the Bell Airacobra, see STEEL, Aug. 11, 1941, p. 42. This is one of the fastest and most heavily armed pursuit ships yet designed. Making 400 miles per hour in level flight, it carries a 37-millimeter automatic cannon that fires through

(*Please turn to Page* 180)

MINUTES...

DECIDE THE FATE OF AMERICA

Thornton's action was the final touch to our heritage of freedom and democracy. President Roosevelt's action pledged that the principles of our forefathers would be upheld—that every American industry—every citizen would protect our great heritage.

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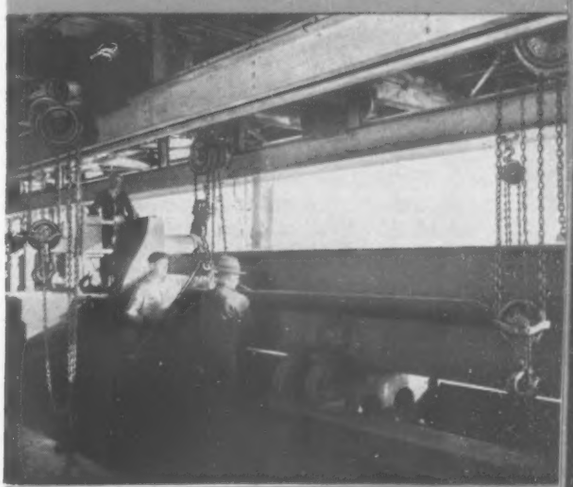
● YALE Electric Fork Truck transports skids of steel stampings quickly.

● YALE Cable King Electric Hoist handles bulky loads easily.

● YALE Ball Bearing Spur-Geared Hoists take steel sheets from rollers.



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● YALE Electric Fork Truck loads quickly, steel sheets in freight cars.

● YALE Ball Bearing Spur-Geared Hoist speeds loading of steel sheets in motor truck.

Heating of Ordnance

(*Continued from Page 72*)

forced convection heating—are being used widely for stress relieving and other low-temperature operations where accuracy of temperature is paramount and where large bulky loads must be handled without danger of overheating. These employ a great flexibility of design and appear in many sizes from some of the smallest to many of the largest furnaces, both batch and continuous in form.

The furnaces just referred to are adapted to the work of heat treating by the usual methods. There are many others which interpret special processes and consist of combinations of well-known heat-treating steps; the use of conventional designs for unusual purposes; and the employment of specific cycles to obtain particular metallurgical results. Furnaces of this kind may not be described without disclosing manufacturing advantages inconsistent with the public welfare. In the language of the patent art, these comprise usual combinations of well-known principles to produce new and improved results.

Any attempt to classify these furnaces in separate groups is complicated by the fact that different types of product are treated in different ways and these treatments are variable in the different members of the group. The following list, therefore, covers furnaces built or under construction for guns, projectile and shell cases of 155-millimeter and the smaller sizes.

It does not include some of the other extremely important applications such as heat treatment of tools, gas carburizing of light armor, treatment of aircraft engine cylinders, aircraft tubing, propellers and the like. All of these are exceptionally important operations in the defense program. The list proposed will not be limited to anti-aircraft guns only, nor to the guns themselves since there is a certain amount of overlapping. A projectile or shell case for a 155-millimeter anti-aircraft gun might demand the same treatment and same furnace equipment as the 155-millimeter

Fig. 4—Slot-type furnace in operation: Unit takes bars 2⅞ inches in diameter by 96 inches long, each bar making five projectiles. Capacity is 1485 pounds of work per hour

secondary battery ammunition for a battleship; and a 3.7-inch or 4.5-inch anti-aircraft gun might take the same furnaces as an anti-tank gun.

With these things in mind, it is possible to arrive at several general groups as follows:

1. Projectile furnaces.

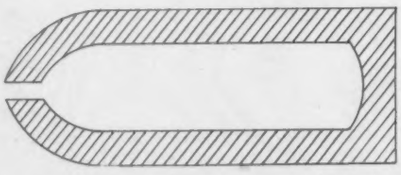


Fig. 6—The open end of the projectile after forging is usually reheated for the nosing operation which partially closes the open end as shown here

2. Shell case or cartridge case furnaces.

3. Gun barrel furnaces.

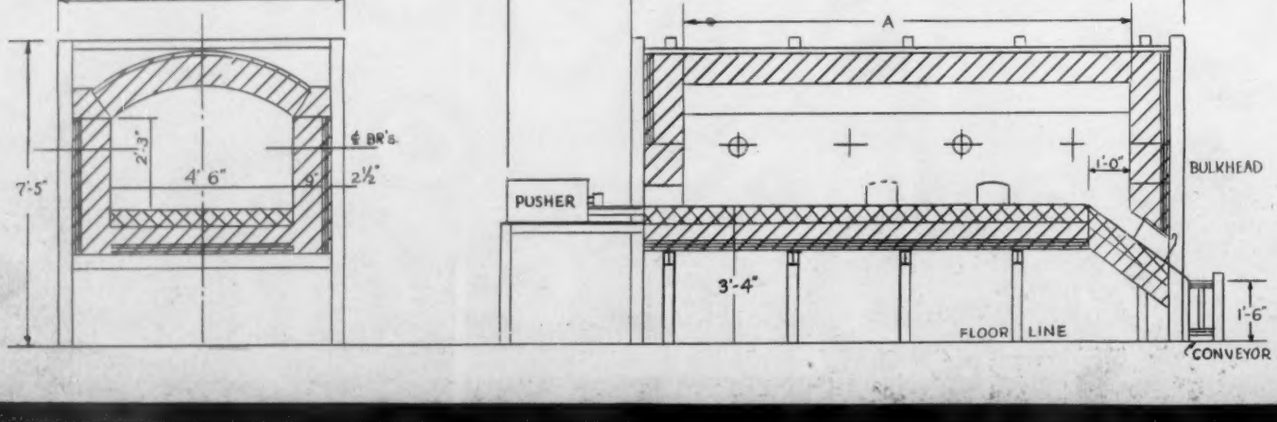
4. Furnaces for gun mounts, carriages, etc.

Projectile Furnaces: Most sizes and types of projectiles are formed from steel billets. Certain trench mortar projectiles, however, are cast from white iron which is then malleableized or given a special heat treatment to insure maximum fragmentation. The following are the usual steel billet sizes: 75-millimeter shell, 3¼ inches diameter by 10.8 inches long; 105-millimeter shell, 3½ inches square by 15 inches long; 155-millimeter shell, 5½ inches square by 20 inches long; 12-inch shell, 13¼ inches square by 28 inches long.

From the furnace standpoint, the manufacture of projectiles embraces four distinct steps—forging; nosing or tapering; normalizing; hardening and drawing.

These operations are modified in certain instances where it is found that a normalize treatment will meet the physical requirements without the hardening and drawing operations. The practice varies in different plants but on one type of 37-millimeter shell, there are four annealing operations before the projectile is ready for tapering. There are then two heat treatments in a liquid bath furnace to permit tapering and mouth annealing and finally a low-temperature stress relief. The pieces are usually water-quenched after each anneal and this operation can be built into a continuous fur-

Fig. 5—This pusher-type billet heating furnace discharges the heated work onto a conveyor which travels to the forging presses. Note burners placed on sides and arranged so gases travel alternately from one side to the other, thus giving good heat distribution



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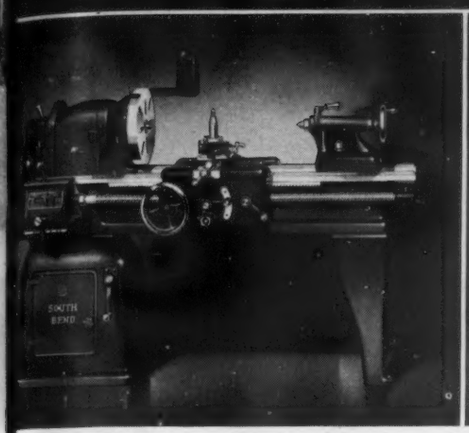
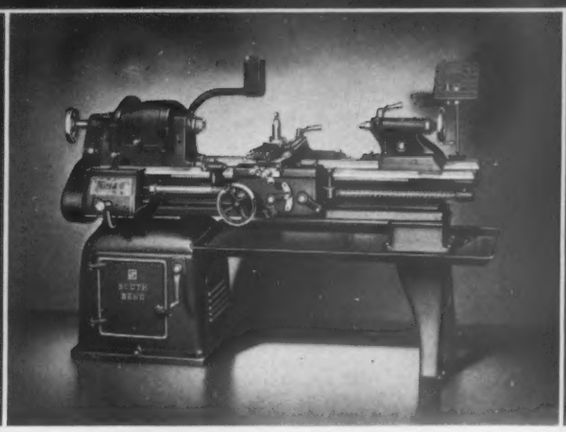


16" swing South Bend Underneath Motor Drive Quick Change Gear Precision Lathe.



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13" swing South Bend Underneath Motor Drive Quick Change Gear Precision Lathe.

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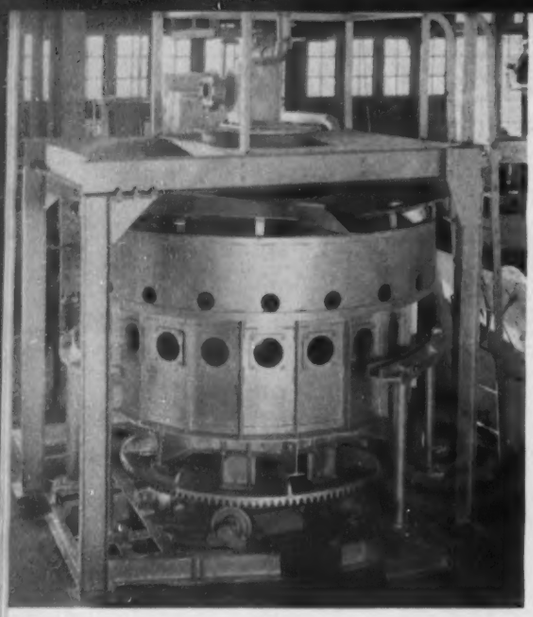


Fig. 9—View of revolving furnace for heating projectiles for nosing: Same type shown diagrammatically in Fig. 8. Some of these units are fitted with devices that remove the heated projectiles progressively as the furnace revolves

nace or performed in an outside quench tank.

Forging: The billets are heated to a temperature of approximately 2200 degrees Fahr. for piercing and drawing. The type of furnace used for this purpose may be a rotary, batch (in and out) or pusher.

Rotary Furnace: Probably the best design for heating billets for forming projectiles by the hammer or press method is the rotary-type furnace. These are usually built in sizes which have capacities varying from 1000 to 10,000 pounds of work per hour and with diameters varying from 6 to 20 feet.

A recent design for such a furnace is shown in Fig. 1. This is a revolving-hearth-type furnace which heats round-cornered square-sectioned billets 5¼ inches on a side by 16¼ inches long, weighing 130 pounds each at the rate of 9000 pounds per hour. Approximately 26,000 cubic feet per hour of 580-B.t.u. gas is required for heating the work to a temperature of 2200 degrees Fahr. The furnace employs 16 variable-flame burners which provide an adjustable atmosphere control to meet a variety of operating requirements. See plan view in Fig. 1 for location of burners. Since these furnaces operate at high temperatures, usually ranging between 1800 and 2300 degrees Fahr., it is best to avoid the use of heat-resisting alloys and to depend entirely upon refractory materials to withstand the furnace temperatures. Units like this are frequently referred to as doughnut-type furnaces since they employ a refractory hearth which supports the work while the entire hearth revolves through successive temperature zones. The result of heat treating in such a furnace is a uniformity of product which is most desirable. This is combined with a sturdiness of furnace structure whose value has been proved in many installations.

Fig. 2 shows a recent installation of such a furnace. This affords an idea of the operation and also of the size of the unit.

The rotary-type doughnut furnace also is used frequently for heat treating the larger shell and airplane engine cylinders. These furnaces, of course, are operated at lower temperatures than the forging furnace, the temperatures having to be controlled within exceedingly close limits. They also cover a wider range of temperatures, usually extending from 800 to 1800 degrees Fahr.

One of these furnaces, for instance, has the following specifications: The outside diameter of the furnace casing is 23 feet. The rotating hearth is 3 feet wide with a mean diameter of about 17 feet. The hearth is built up of firebrick piers capped with alloy plates. This unit has a capacity of 8000 pounds per hour of airplane engine cylinders or projectiles. It is direct fired, under and over the work, by high-pressure gas burners. For the low temperature ranges, the Conjecto method of firing is used to insure temperature uniformity.

One interesting feature of this furnace is that no seals are needed. Furnace pressure in the three zones is controlled automatically, and there is no apparent leakage of air into the furnace nor outward flow of gases either at the full firing rate or when holding. One plant alone has five of these units in operation or under construction at the present time.

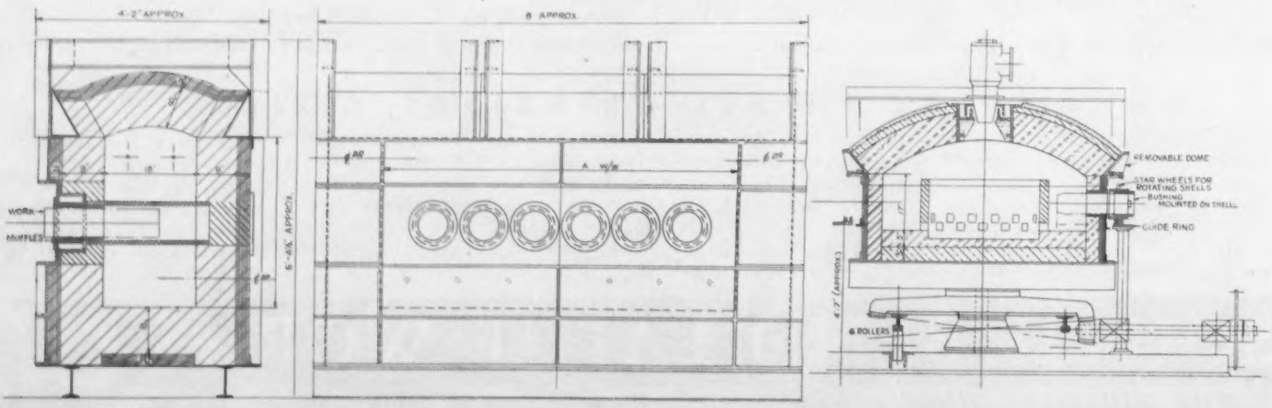
Batch-Type Furnaces: In some cases, when forging, it is desired to heat the steel in the form of a bar by placing one end in a furnace and subsequently cutting the bar to the desired length. For this purpose, a slot-type forge furnace is used, such as is illustrated in Figs. 3 and 4. In this case, a bar 2⅞ inches in diameter by 96 inches long is heated by placing one end in the furnace. Such a bar will make five projectiles weighing approximately 33 pounds each. Working in this way, a furnace of this kind will produce approximately 45 pieces, or 1485 pounds of net work per hour. In some factories, there is no subsequent heat treatment of the projectiles after forging but considerable care is taken to cool them slowly from the forging temperature.

The furnace just described is heated by means of a combination oil-gas burner. This is proving extremely effective in controlling the type of scale formed on the work during heating. This combination burner can be set to secure almost any kind of scale desired as distinguished from the two set types of scale which may be obtained when heating with gas or with oil alone. It is sometimes desirable to produce a relatively heavy scale which may be removed without difficulty thereby giving a perfectly clean heated bar so that the shell may be sent to the machine shop without any surface cleaning at all. When conducted in this way, the results obtained by such a treatment are superior in quality so this unit has been found particularly satisfactory.

(*Please turn to Page* 168)

Fig. 7—This furnace, lower left, employs silicon carbide muffles to protect the work from the flame. Here projectiles are inserted, open end first, and heated to 1850 degrees Fahr. for the nosing operation

Fig. 8—Here, lower right, entire furnace revolves: Projectiles are inserted through openings in outside of furnace so only portion of open end is heated for nosing. Note provision for revolving the projectile to assure uniform heating



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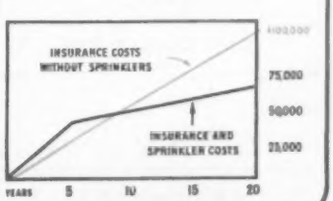
A. 43% of all burned businesses are never resumed, regardless of insurance.

Q. My building is metal; its contents are non-combustible. Why should I have sprinklers?

A. A metal mill burned to ruins in an afternoon. Oil vapor had condensed on inside walls.

Q. What do you mean – a Grinnell System pays for itself?

A. The chart shows a typical case. Insurance without Grinnell System, $5,000 yearly. With Grinnell, premium reduction paid for the system in 8-1/3 years. After that, $3,000 a year clear saving!



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. . . . . poor fitup can raise welding costs greatly. But how much investment in equipment is justified by the economics of good fitup? This is explained—with typical examples to show how it works

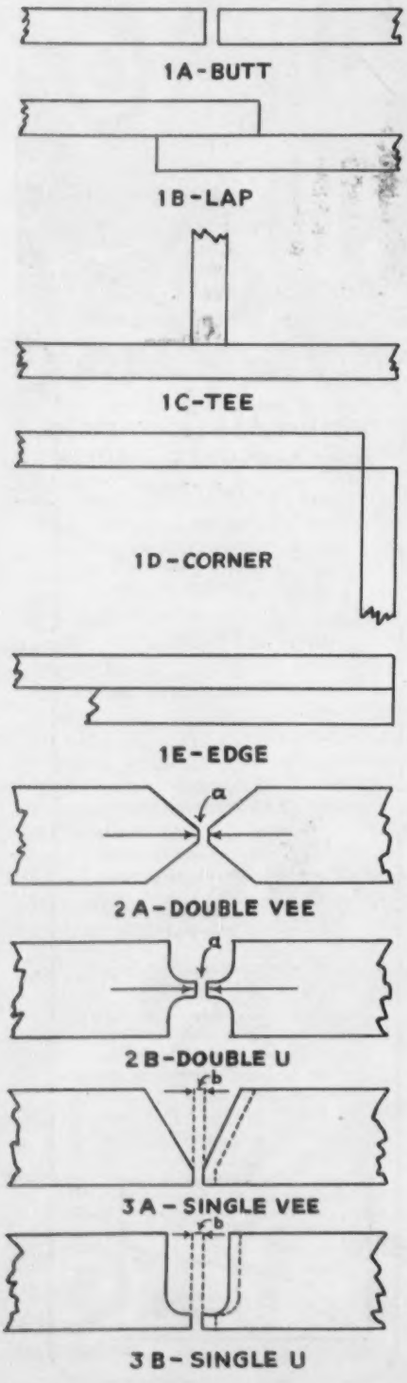


Fig. 1. (Top)—The five types of welded joints: 1A, butt; 1B, lap; 1C, tee; 1D, corner; 1E, edge

Fig. 2. (Center)—Here are double V, 2A, and double-U, 2B, types of joints for welded connections

Fig. 3. (Bottom)—Here solid lines show good fitup, with dotted lines illustrating poor fitup. The extra weld metal that must be deposited in those with poor fitup is costly, greatly raising the cost of the weld

■ IN PRECEDING articles in this series, reference has been made to position of joints and positioning for welding without considering the details of the type of joint involved. In this article, the type of joint will be considered in relation to fitup.

First of all, there is the butt joint, Fig. 1A, where the edges must be accurately fitted together whether the joint be square grooved, beveled or otherwise prepared. Then there is the lap joint, Fig. 1B, where considerable variation in the dimensions may exist. In the Tee, Fig. 1C; corner, Fig. 1D; and edge joint, Fig. 1E, fairly accurate fitups are required, depending upon the particular product.

Right here let it be clearly understood that the discussion is not at this time in reference to mechanical characteristics of the completed joint or strength requirements. Here we are not discussing whether a lap joint or a butt joint should be used, but we are assuming that the type of joint has been selected and we are studying the relation of the type of joint to fitup, welding speed and welding costs.

For example, assume accurate fitups of butt joints as indicated in the sketch, Fig. 2, which shows a double V and a double U. If the dimensions are correct, certain costs will apply to these joints.

However, suppose dimension *a* is 1/16-inch too long. Then the additional and useless cost for a joint 1-inch thick is of the order of 50 cents or more per foot of joint. The speed is correspondingly reduced, depending upon the type of joint preparation. It is obvious that where joint edge is such as to keep weld metal at a minimum, this reduction in speed and increase in cost is a higher percentage than otherwise. See Fig. 3.

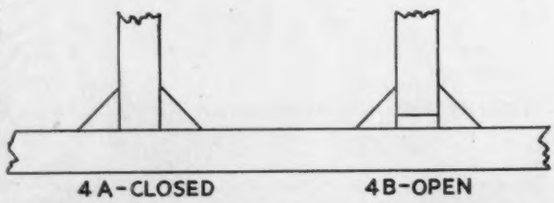
If the joint fitup is poor—that is, if the edges are separated a distance *b*, Fig. 3, more than necessary—then the additional volume of weld metal required because of this poor fitup is a greater proportional increase in Fig. 3B than it is in Fig. 3A due to the geometry of the joint.

Another example is a fillet weld where the bead is, say, ¼-inch, Fig. 4A. Due to misalignment, there is an increase of 1/16-inch in the dimension of the fitup of the vertical plate against the horizontal. This produces then an effect of a 5/16-inch bead, Fig. 4B. Now using a reasonable percentage of overhead, this would cost approximately 40 cents per foot of joint for the double-bead joint. This cost then is increased in the ratio of the increase of the size of the fillet—a matter of 63 cents per foot of joint. And this does not take into account the added difficulty in making joint Fig. 4B due to the wide spacing, additional weld metal needed, burning away of material etc.

Such a condition of poor fitup may

(*Please turn to Page* 174)

Fig. 4. (Right)—Good fitup between vertical and horizontal plate is illustrated at 4A. Poor fitup for same type joint is shown at 4B. Note the extra weld metal that must be deposited, necessitating a larger fillet, a slower welding job and a more difficult weld to make



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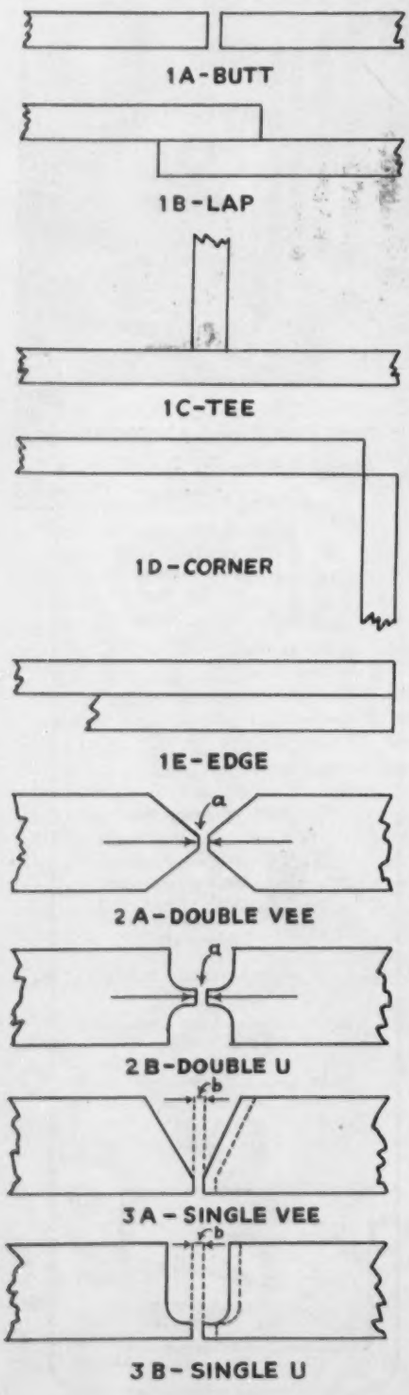

Fig. 1. (Top)—The five types of welded joints: 1A, butt; 1B, lap; 1C, tee; 1D, corner; 1E, edge

Fig. 2. (Center)—Here are double V, 2A, and double-U, 2B, types of joints for welded connections

Fig. 3. (Bottom)—Here solid lines show good fitup, with dotted lines illustrating poor fitup. The extra weld metal that must be deposited in those with poor fitup is costly, greatly raising the cost of the weld

■ IN PRECEDING articles in this series, reference has been made to position of joints and positioning for welding without considering the details of the type of joint involved. In this article, the type of joint will be considered in relation to fitup.

First of all, there is the butt joint, Fig. 1A, where the edges must be accurately fitted together whether the joint be square grooved, beveled or otherwise prepared. Then there is the lap joint, Fig. 1B, where considerable variation in the dimensions may exist. In the Tee, Fig. 1C; corner, Fig. 1D; and edge joint, Fig. 1E, fairly accurate fitups are required, depending upon the particular product.

Right here let it be clearly understood that the discussion is not at this time in reference to mechanical characteristics of the completed joint or strength requirements. Here we are not discussing whether a lap joint or a butt joint should be used, but we are assuming that the type of joint has been selected and we are studying the relation of the type of joint to fitup, welding speed and welding costs.

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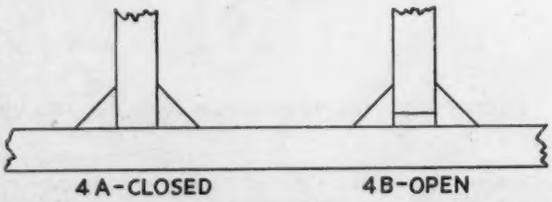

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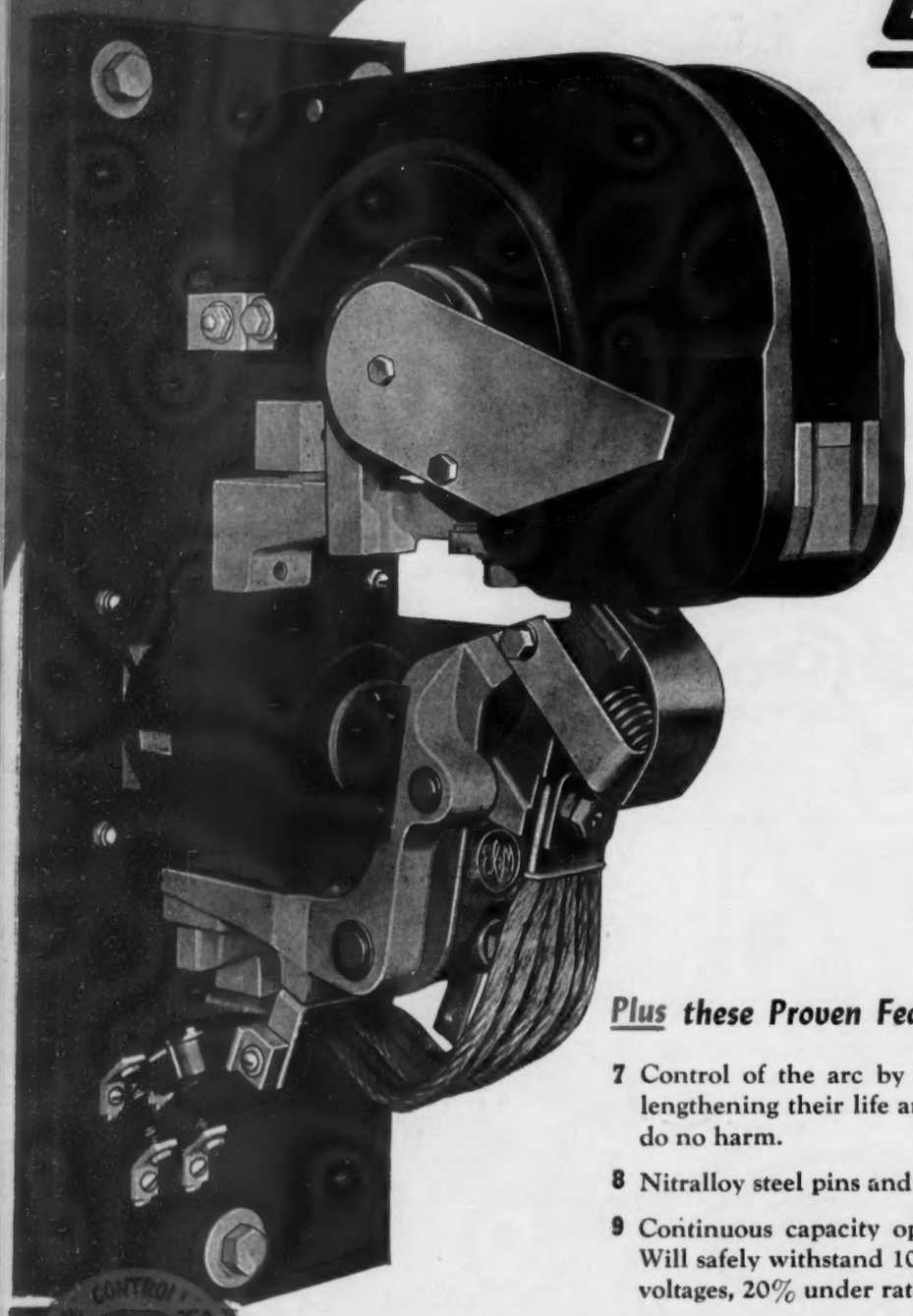

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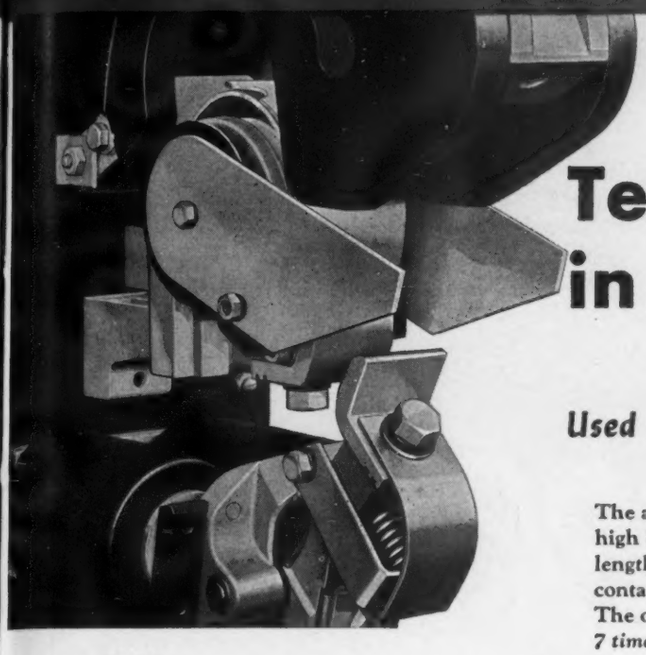

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No. of operations on original contacts.....	2,080,724
Life of original contacts in days.....	208
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Greatly improved contact-life is only one indication of the quality of this contactor. Mechanically, it has successfully withstood nearly 6 million operations in this 19-month period—bearings, shunts, etc., being in good condition and capable of many more million operations.

LINE-ARC Blow-out feature designed to handle highly inductive circuits as experienced on this 2-motors-in-series circuit as well as for normal service encountered in single motor circuits. When buying D-c Motor Control, specify EC&M *LINE-ARC* Contactors—a complete line for crane and mill auxiliary service.

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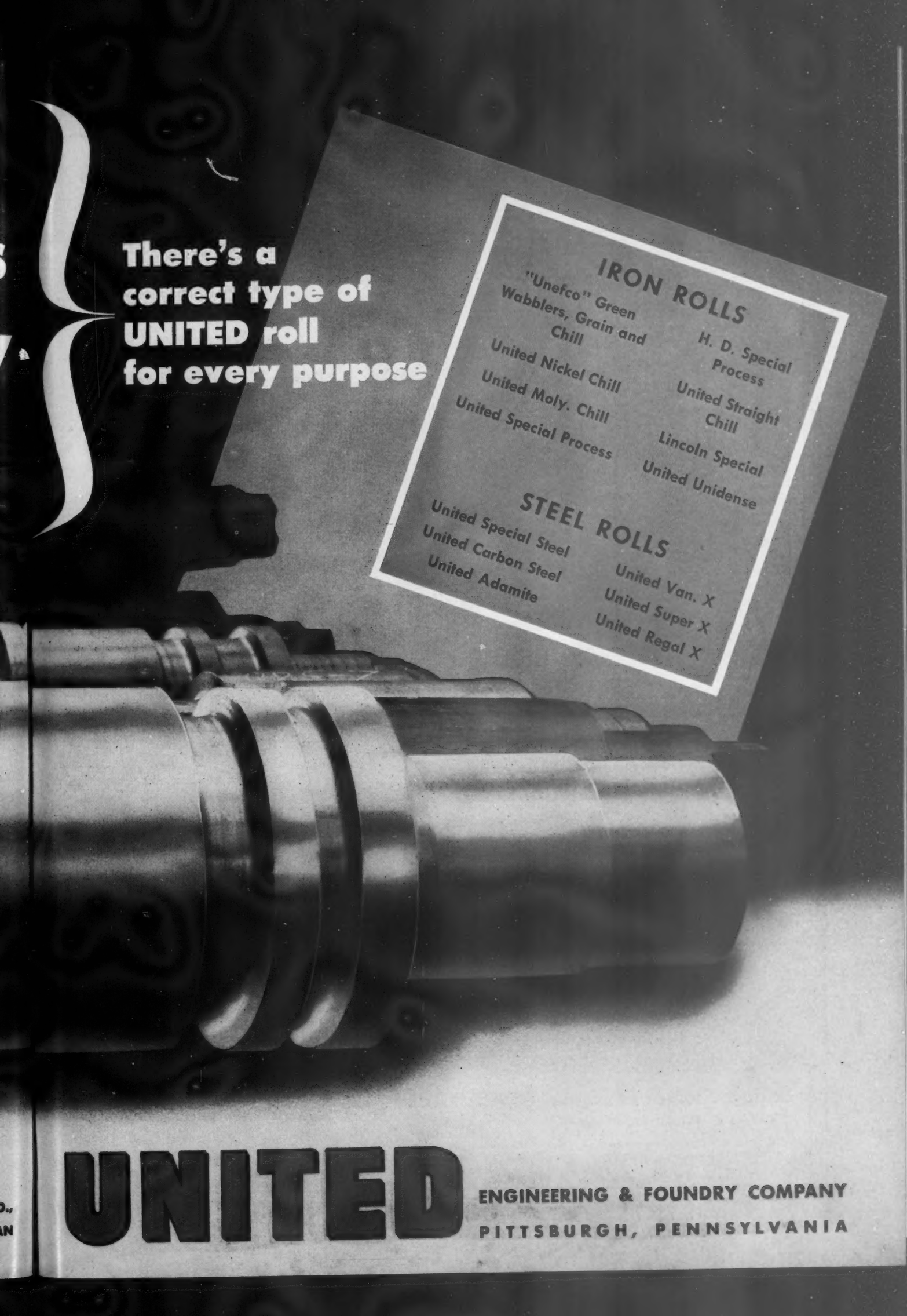
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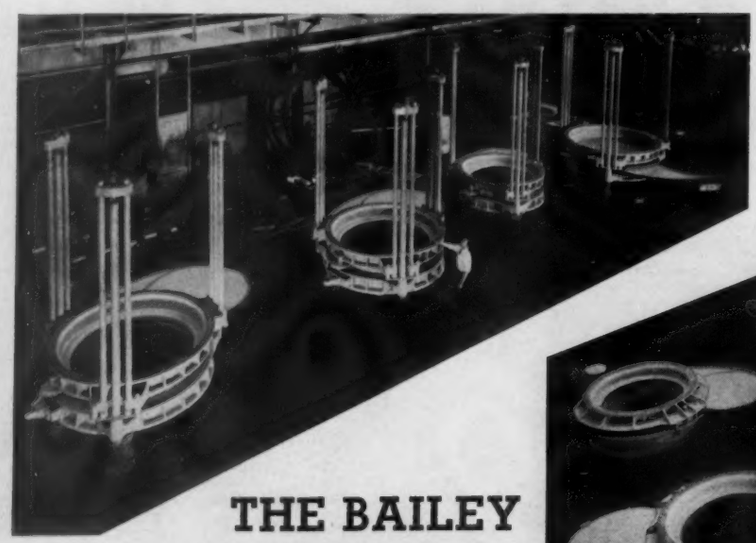

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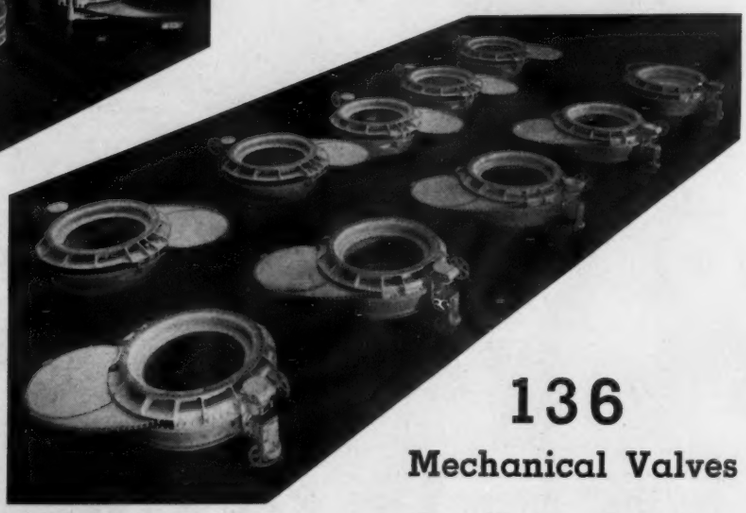

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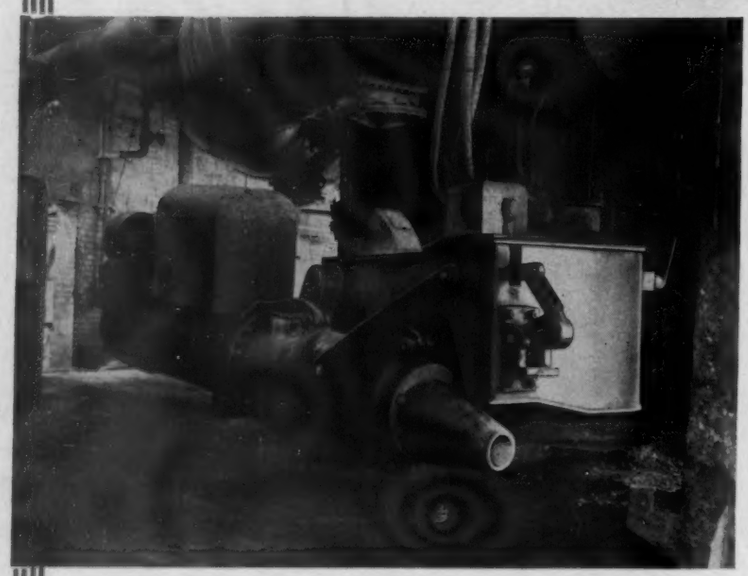

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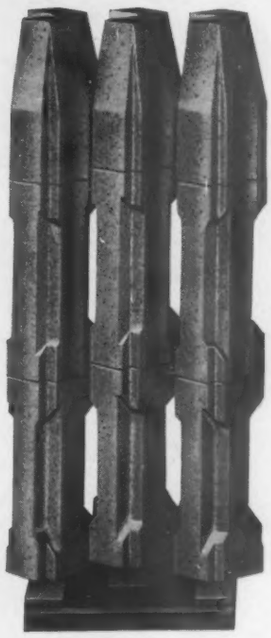

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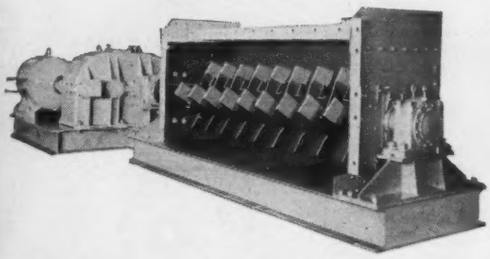

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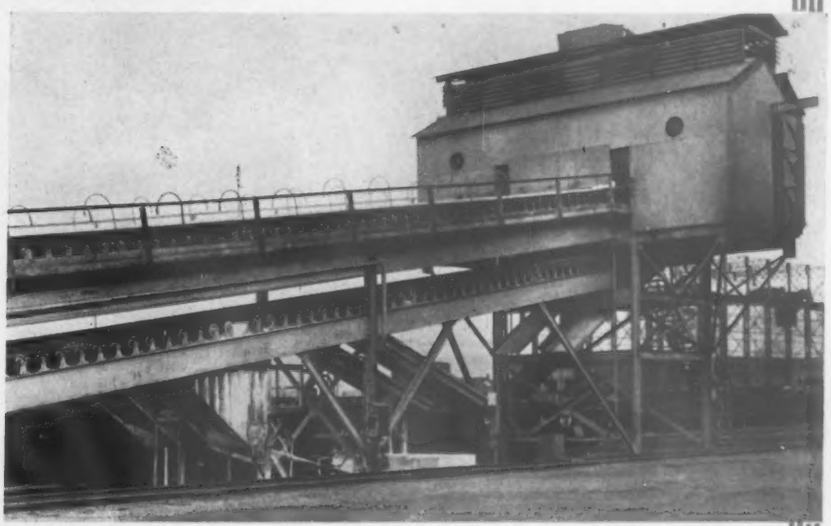

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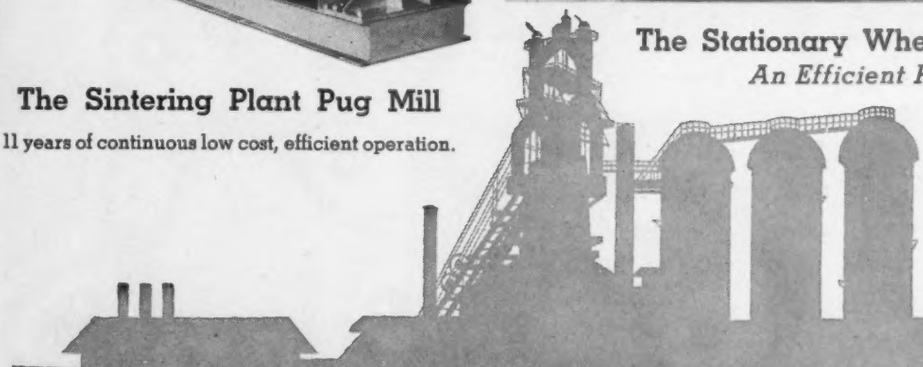

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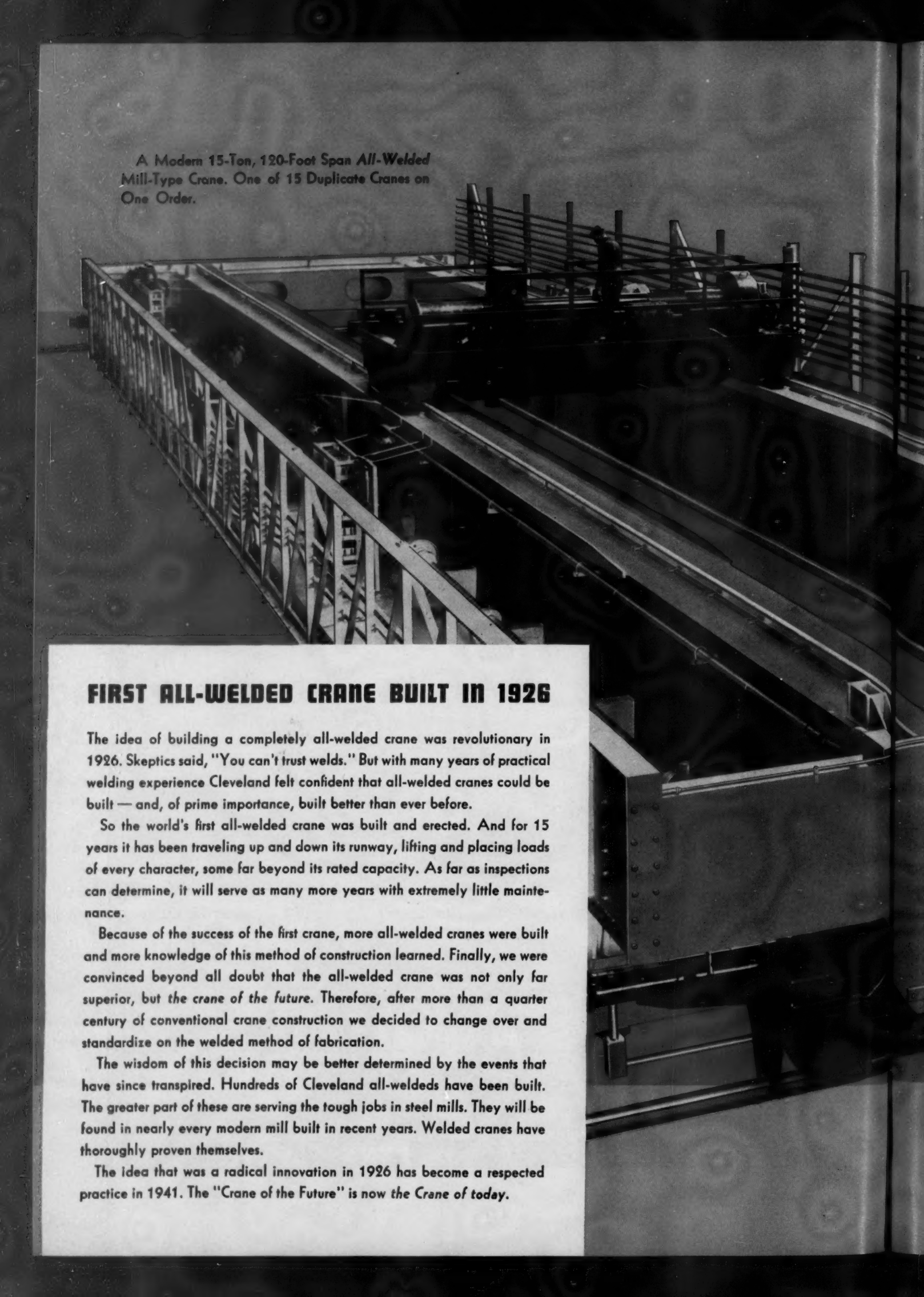

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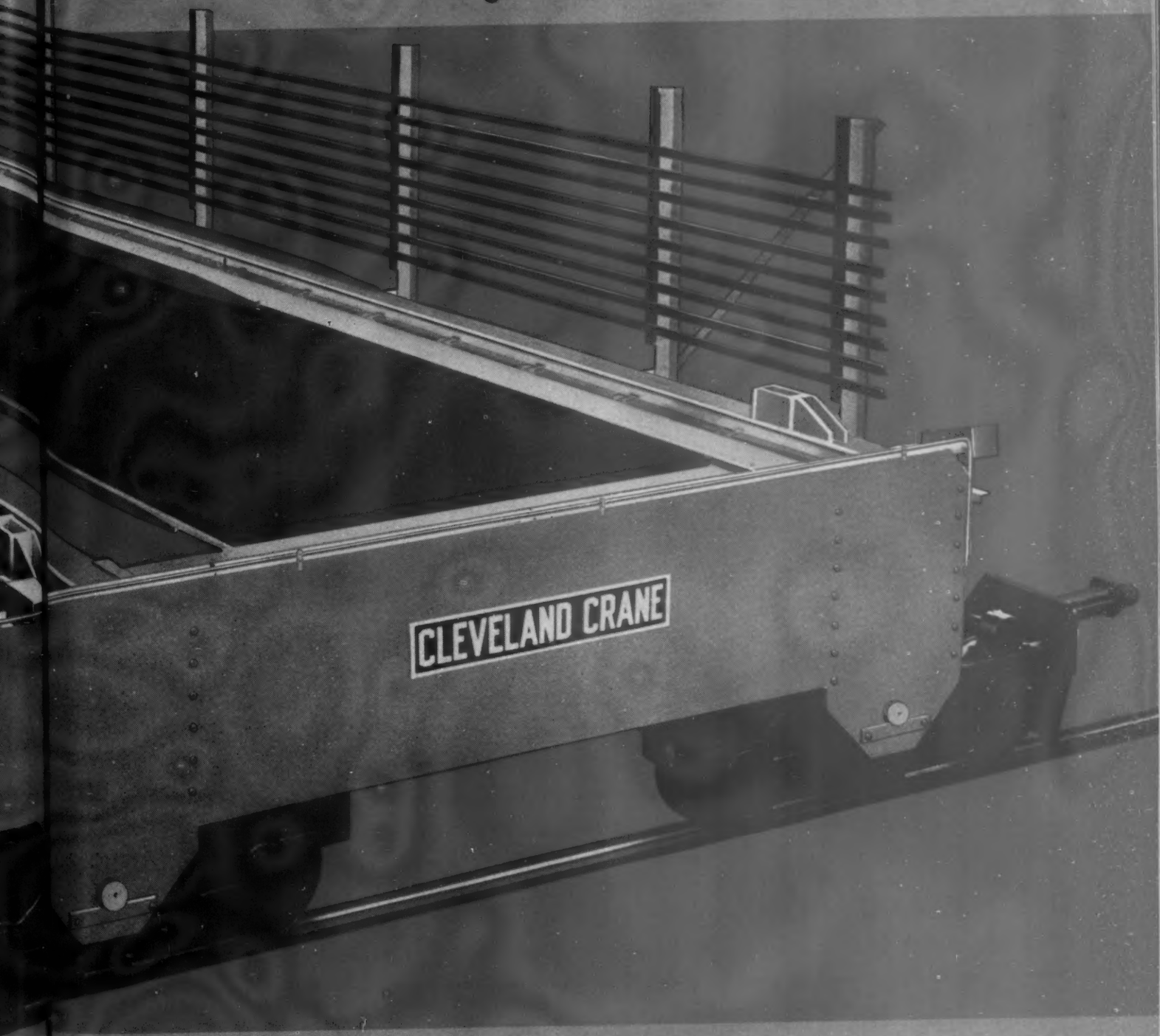

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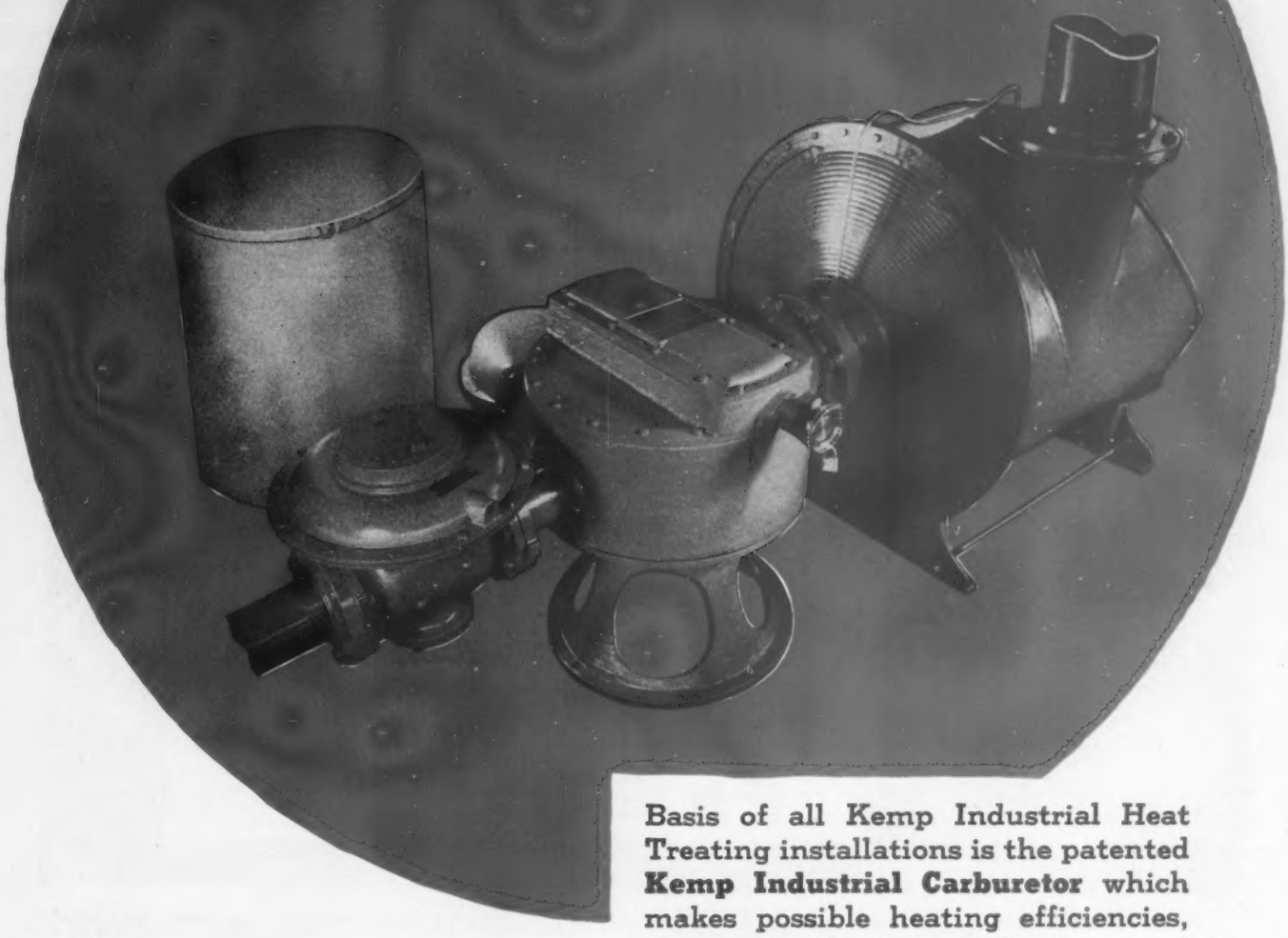

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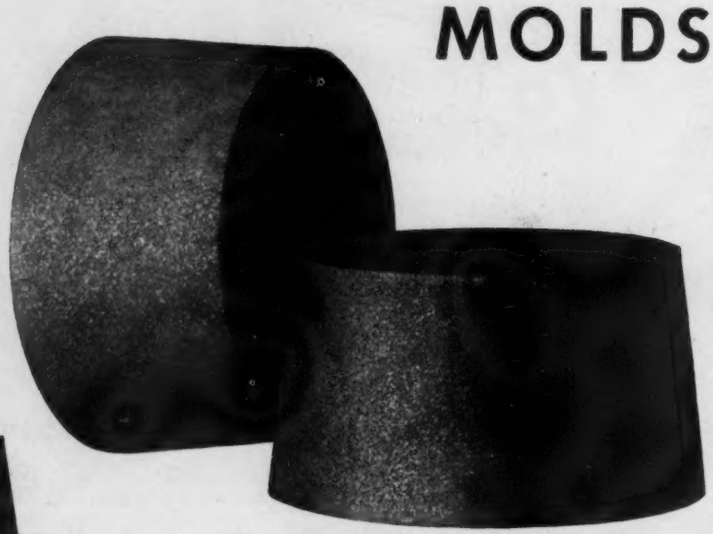

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This annual meeting takes on added importance this year because of the pressing demands being made on the industry for more and more production. Naturally our program and activities have been arranged so as to give the proper consideration to the solving of these many operating problems.

Firmly believing that participation in these activities will open up new channels of thought leading to improvements in our daily work, we sincerely hope that each and every one in attendance will take full advantage of the opportunities offered. If this is done conscientiously, the benefits to the individuals, to the industry and to the national defense program will be manifold.

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Left, tapping a heat of basic open-hearth steel. Thimble at right catches overflow slag from steel ladle. Above, start of a cast at No. 2 blast furnace at Otis Steel Co.

Engineers to be FIRST AMERICAN BASIC

■ SIXTY-SEVEN years ago the Otis Steel Co., known as the Otis Iron & Steel Co., engaged in the steel business as a producer of plate, bar steel and forgings. The summer of 1873 ground was broken for its original plant identified as the Lakeside works, fronting 1500 feet on Lake Erie, but the plant did not start operations until the fall of 1874.

Otis Iron & Steel Co. was the first plant in the United States to be built for the exclusive manufacture of open-hearth steel. S. T. Wellman came to Cleveland in 1873 to design and build the Otis works with which he was connected as the engineer and superintendent for a period of 16 years. He worked out two inventions during that time that are indispensable to the economic operation of an open-hearth plant, namely the open-hearth charging machine and the use of the electro-magnet for handling pig iron and scrap.

As originally built the melting shop consisted of two 7-ton furnaces with a regenerative preliminary furnace for preheating the blooms before adding them to the bath, and a regenerative crucible ferromanganese furnace. The charging platform was raised 10 feet above the ground level and the material to be melted was raised by hydraulic elevators. The steel was tapped into a ladle supported by a jib crane which was simply a swing without a lift. The crane was on the centerline between the two furnaces, and the ladle swung around to tapping spout of each. A swinging platform for the men to stand on when tapping the furnace was supported at one end on the mast of the ladle crane and at the other on

This stack recently was remodeled after having been in blast continuously for 10 years. Photos courtesy of Norbert Yassanye. Right, exterior of soaking pit building

Guest of STEELMAKER

wheels that ran on the plates which covered the walls of the casting pit.

The first heat of steel was made October, 1874 from charcoal blooms from Lake Champlain district melted in a bath of Lake Superior charcoal iron.

Starting of the furnace was attended with the usual mishaps. One of the things that happened before any metal was charged was a terrific gas explosion, which cracked the main gas flues, loosened up the gas and air valves, and loosened things up generally.

In 1878, two 15-ton furnaces were added. In 1881 two more 15-ton furnaces were installed, and in 1887 two additional furnaces of the same size. These last two furnaces were a radical departure from anything that had been built before in that the regenerators were located beneath the charging platform instead of being placed under the furnace proper.

One of the acid furnaces was changed over to a basic bottom in 1886 and it was from this furnace that the first heat of basic open-hearth steel to be made in the United States found its way into the ladle. A small cargo of Styrian magnesite was secured and a lining of this was put in on top of the silica bottom which had been melted down low. The magnesite after being mixed with tar was rammed in place while furnace was cold. The furnace was operated for some four months, making a good quality of basic steel. The basic furnace, however, was not as productive as the acid furnace and because of pressure from the sales department, the basic unit was changed back for acid practice.

THE COOPER-BESSEMER CORPORATION

MACHINERY BUILDERS — SINCE THE YEAR 1833

ENGINES AND COMPRESSORS

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P O W E R ! M O R E P O W E R !

In every period of national emergency since 1833, our company has heard that call ... and heeded it!

Today, the urgent call for Power - More Power is being sounded again ... and we are furnishing it! Diesel engines for ships and locomotives, gas and diesel engines for industrial and municipal power plants, engine and motor-driven compressors for the refining and transportation of fuels and oils, and for the important process industries ... these are our answers to the need!

Every engineering and production facility of this company's plants and workers is being devoted to the needs of our government and our valued commercial customers. As in every previous period of national emergency, this company's products will advance with the crisis ... in the skill of their building, in their increased efficiency, in their dependability!

We have put our shoulders to the increasing task of Power for Defense. To our customers in the marine, petroleum, industrial and municipal power fields we say, "This is our job today. This is your guarantee of even better engines and compressors today and tomorrow!"

Yours very truly,

THE COOPER-BESSEMER CORPORATION

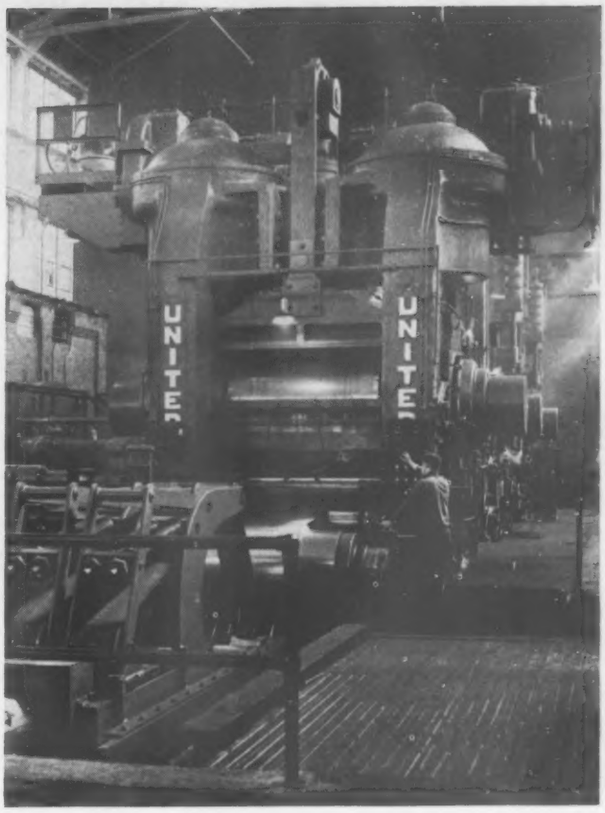
Plans were laid in 1912 for expansion of plate rolling capacity and about 200 acres of land on Cuyahoga river were purchased. This was known as the Riverside plant and consisted of a 3-high 72-inch plate roll, jobbing mills and two cold mills.

In 1889 control of the Otis Iron & Steel Co. passed into the hands of British stockholders known as Industrial & General Trust Ltd. The plants continued under this management until July, 1919 when they came under American control, with W. G. Mather as chairman and George Bartol as president.

During October, 1919 the Otis Steel Co. acquired the holdings of the Cleveland Furnace Co., including 150 acres with an extensive frontage on the Cuyahoga river and bordering on its property. This plant included two modern blast furnaces with ore docks and ore handling machinery and 100 by-product coke ovens.

To round out its range of gages the Otis company built eight sheet mills. The next logical step to bridge the gap from the production of finished products was the installation of steelmaking facilities and a blooming and sheet bar mill. The initial operation of the open-hearth and blooming mills began during January, 1924. The original open-hearth shop consisted of four furnaces which since has been enlarged to eight 150-ton furnaces of the stationary type. These units have an annual capacity of 752,000 net tons.

In 1931 a 72-inch hot strip mill was built at the Riverside plant. This unit went into operation in January 1932 and had a rolling width of 66 inches in 12-gage and heavier, and correspondingly lighter gages in smaller widths. The mill was widened in 1938 to 77 inches and cold rolling, pickling, annealing and finishing facilities modernized. At present the mill will roll hot strip from 21 to 74 inches wide from 19 gage to ½-inch thick at 50,000 tons a month.

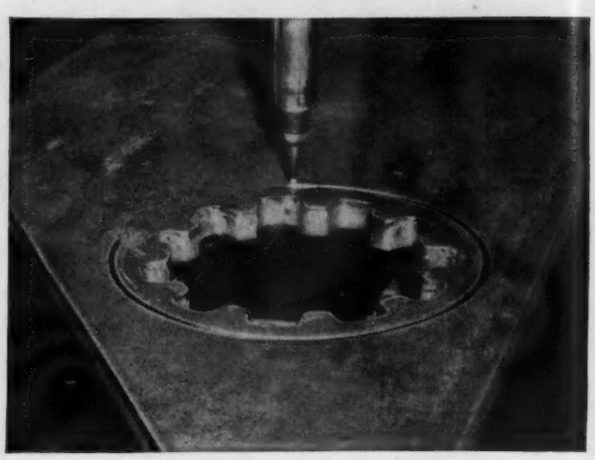


Addition of this third stand to the Otis Steel Co.'s cold strip facilities doubled rolling capacity and speed. The mill is equipped with the most modern lubrication and motor controls and is first unit served by belt wrapper

Top of No. 2 stack of the Otis group of blast furnaces at the Riverside works. This stack recently was remodeled and its capacity increased to 900 tons a day. The furnace is served by modern turboblowers and high-pressure boilers

To Keep the Work Moving..and *take full advantage of Linde*

OXY-ACETYLENE welding and cutting is good "insurance" against costly delays and undue depreciation of plant equipment. If you are prepared to use this versatile and convenient method of shaping, severing, fabricating, and reclaiming metals and metal parts, you may save—*on just one occasion*—many times the moderate cost of your oxy-acetylene apparatus. In addition, you will find that regular use of the oxy-acetylene flame processes will help you speed up your work and will show better results. The pictures illustrate a few of these processes.



When new parts are needed—Useful parts and equipment can be fabricated quickly by oxy-acetylene cutting and welding. Oxweld shape-cutting machines produce accurately shaped parts, and welding joins them.

Learn more about LINDE PRODUCTS *and* PROCESSES *at* THE IRON AND STEEL EXPOSITION, CLEVELAND, SEPTEMBER 23-26

You are invited to visit the Linde exhibit at the Iron and Steel Exposition—Exhibit Area 94-95, Public Auditorium, Cleveland, Ohio.

Here you can discuss with Linde representatives latest developments in use of the oxy-acetylene process to speed up production and lower operating costs. Information will be available on apparatus and methods for deseaming and conditioning of steel—for cutting off bars and billets—for flame-cutting and softening air-hardening steels—for plate-edge preparation — for Unionmelt welding — and many other time-saving applications of the oxy-acetylene process.

You can also learn more about the availability of Linde products, and the Linde service which helps Linde customers get good results from use of Linde processes.

LINDE OXYGEN, NITROGEN · PREST-O-LITE ACETYLENE · UNION CARBIDE · OXWELD,

"Linde," "Prest-O-Lite," "Union," "Oxweld," "Prest-O-Weld," "Purox," "Haynes Stellite," and "Unionmelt" are trade-marks of Units of Union Carbide and Carbon Corporation.

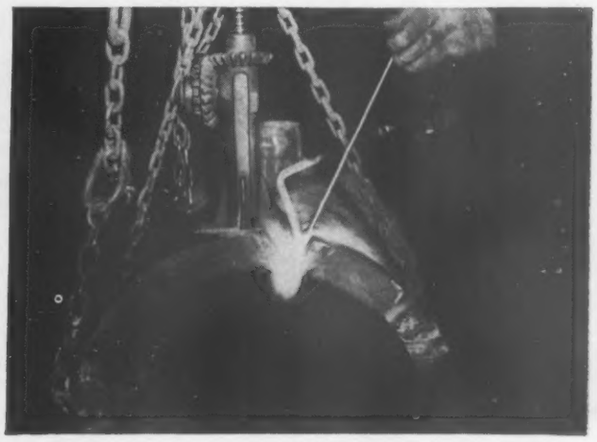
to Lower Maintenance Costs . .

Products and Processes!

To prevent wear—By hard-facing with Haynes Stellite rods, parts subjected to abrasion can be made to last longer—avoiding down-time, saving replacement costs, and often reducing power consumption.

To cut steel to length—Hand-cutting is used to cut structural steel to length, to cut off pipe or bars, and to remove rivets. Machine-cutting is used to split I-beams, and to prepare plate edges for welding.

Before paint is applied—Flame-priming of structural steel before painting pops off loose scale and drives out surface moisture. The paint flows on the warm metal faster, bonds tighter, dries quicker, and lasts longer.



When vital parts break or wear—Shutdowns frequently can be avoided by repairing broken gears, engine heads, brackets, and other parts, right on the job, by bronze-welding. Worn parts can be economically reclaimed.

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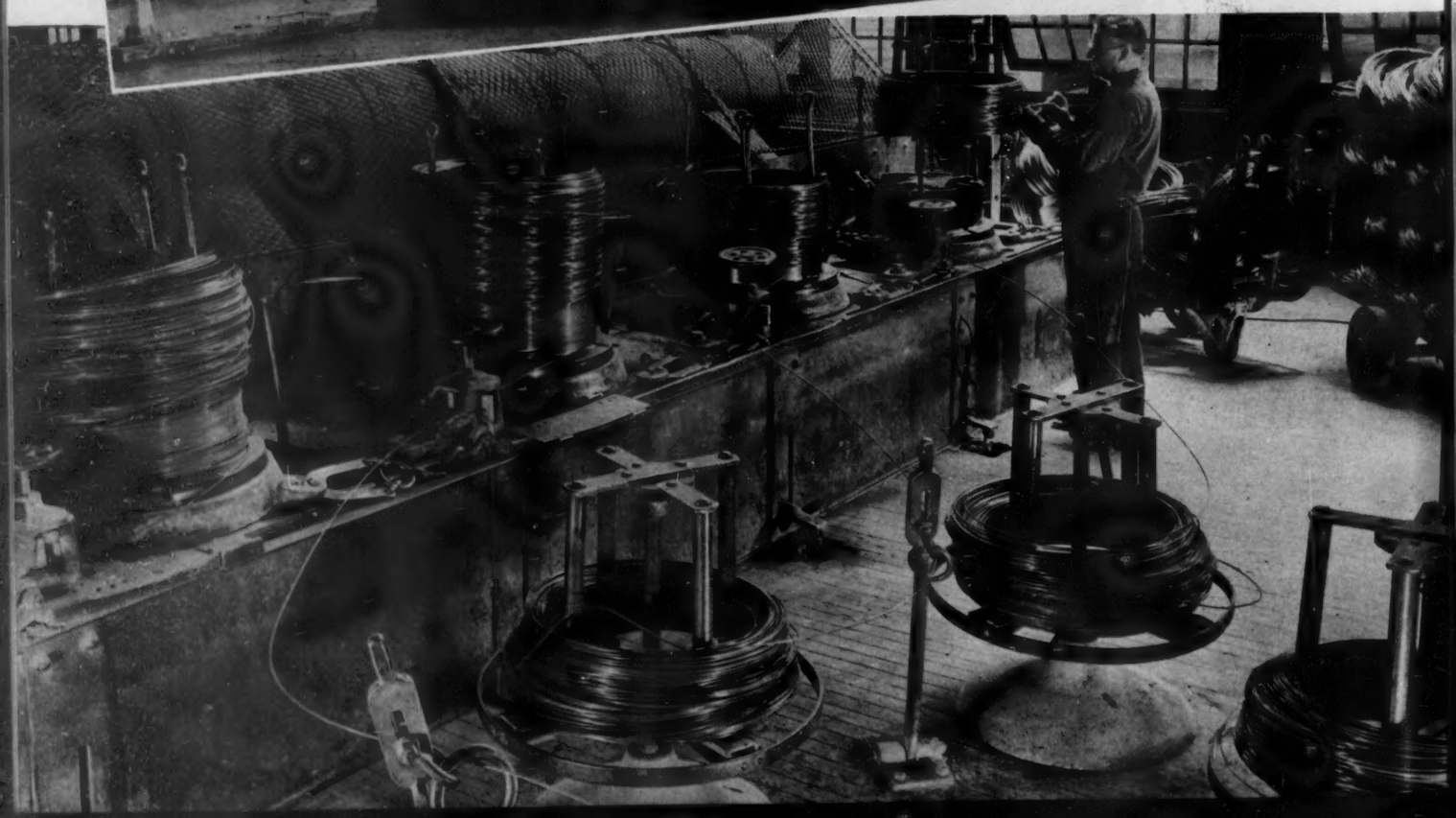


Traffic

■ MANY OF the engineers attending the thirty-seventh annual convention of the Iron and Steel Engineers at Cleveland Public Auditorium, Sept. 23-25, will examine two objects in the public square with professional interest and take their hats off to the men, mostly dead and gone now, who fashioned them with masterly skill. One is the bronze figure of Moses Cleaveland which stands on a marble pedestal and the other is a wrought iron flag staff mounted on cast iron base anchored solidly to a masonry foundation. The flag staff is tapered from two feet in diameter at the bottom to a few inches diameter at the tip, 200 feet above the foundation.

Flag staff and monument, iron and bronze, reflect credit on the steel craftsmen who fabricated them and yet it is doubtful if one of the many persons who daily pass through this section of the city, favor them with a glance. Yet they have an interesting background.

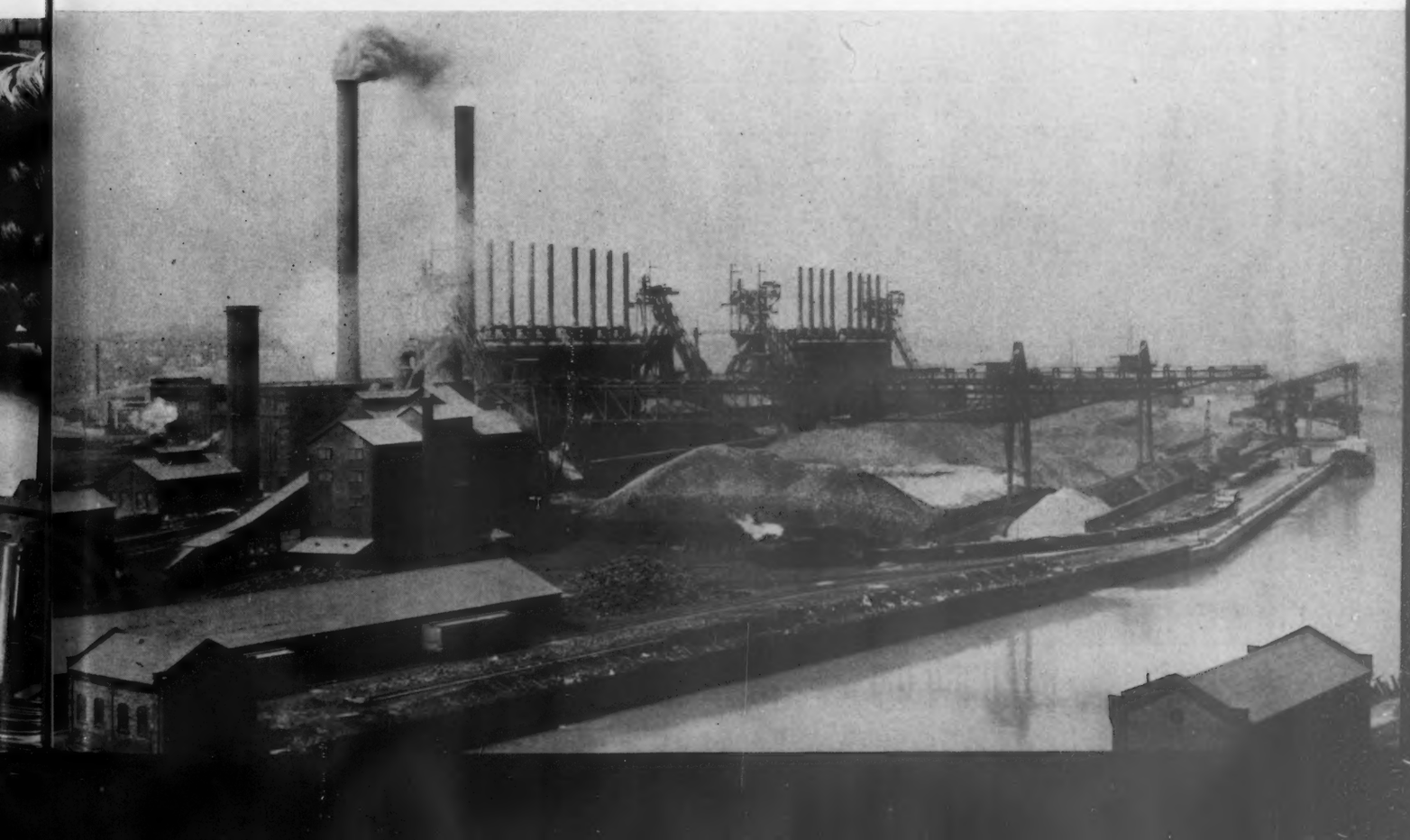
The statue of Cleaveland is a product of Bureau Bros., Philadelphia, a firm that is also responsible for the figure of Liberty on top and for the color guard roof flanking one side of the monument, nearby, erected to perpetuate the memory of men from Cuyahoga County, O., who served in the sea and land forces of the United States in the Civil war. Excursion trains from all over the state were run to the city when this monument, one of the finest of its kind in the country, was unveiled with impressive ceremonies in 1894.

For many years this monument dominated the public square, but in recent years it has been overshadowed by skyscrapers on all sides, culminating in the Terminal Tower over the Union Station, soaring to a height of nearly 800 feet.

Wrought iron plates for the flag staff were rolled in 1876 at the plant of the Cleveland Rolling Mills, Newburgh, formerly a plant of the American Steel & Wire Co.

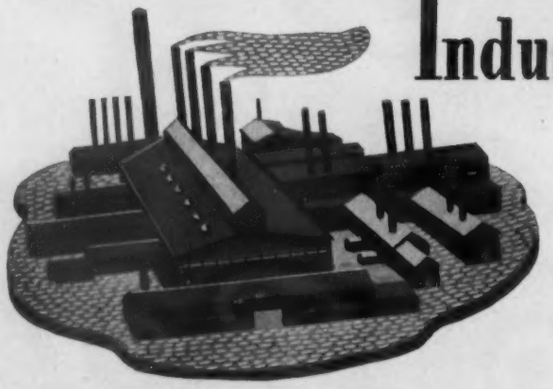
The plates were donated by the Rolling Mill company and were cunningly shaped and riveted by the Old Variety Iron Works, one of the pioneer fabricating plants in the city. The plates were fitted so

Left, statue of Moses Cleaveland in public square. Downtown Cleveland skyline showing coast guard station and Cuyahoga river down which ore boats are towed to iron and steelworks. Wire drawing frame at Cuyahoga works of the American Steel & Wire Co. Below, blast furnaces and ore docks of Corrigan McKinney plant of the Republic Steel Corp.



106 SOLD IN LESS THAN 4 YEARS

59 ORDERED IN LAST 12 MONTHS



Industry goes "all out" for AMCO Pit Furnaces

When introduced four years ago, AMCO Pits established new production, fuel, maintenance and other unprecedented records for ingot-heating.

Today, because of continued refinements and improvements, AMCO Pits provide even greater over-all economies, PLUS 10% further increase in production.

7

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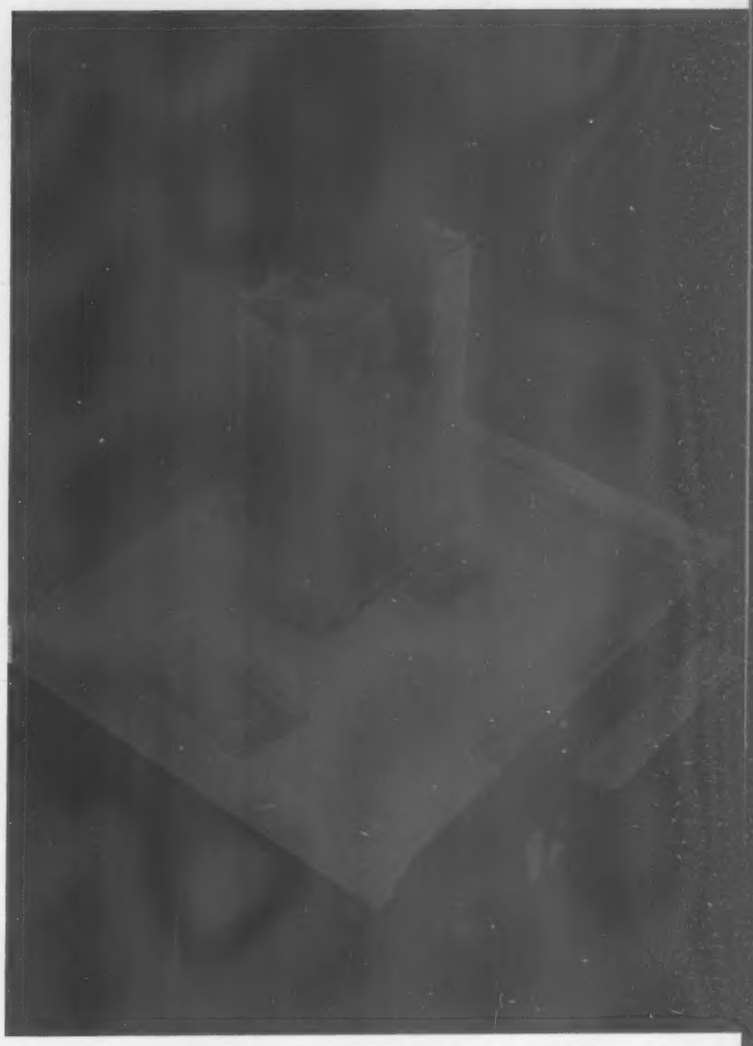
Hot ingot being removed from soaking pit at the Corrigan McKinney plant of the Republic Steel Corp. Slabbing ingots of this type are converted into wide stripsheets

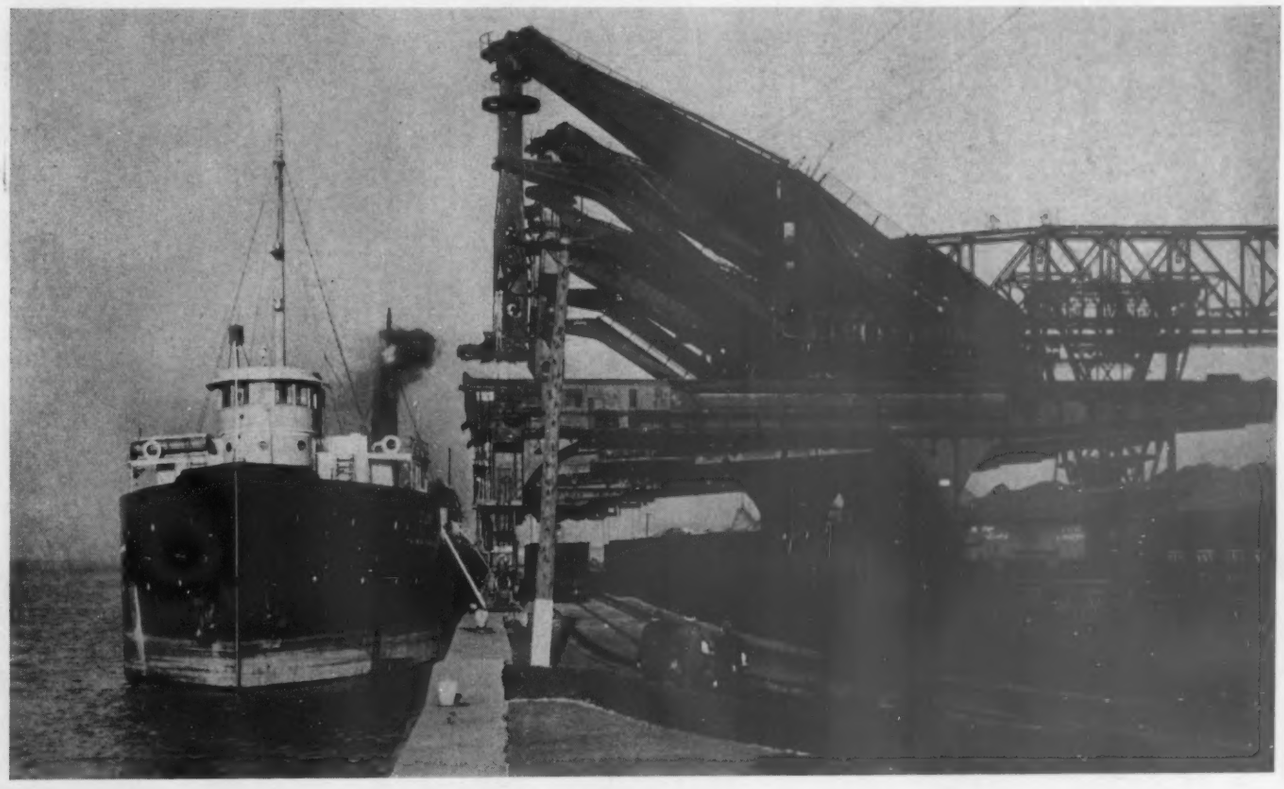


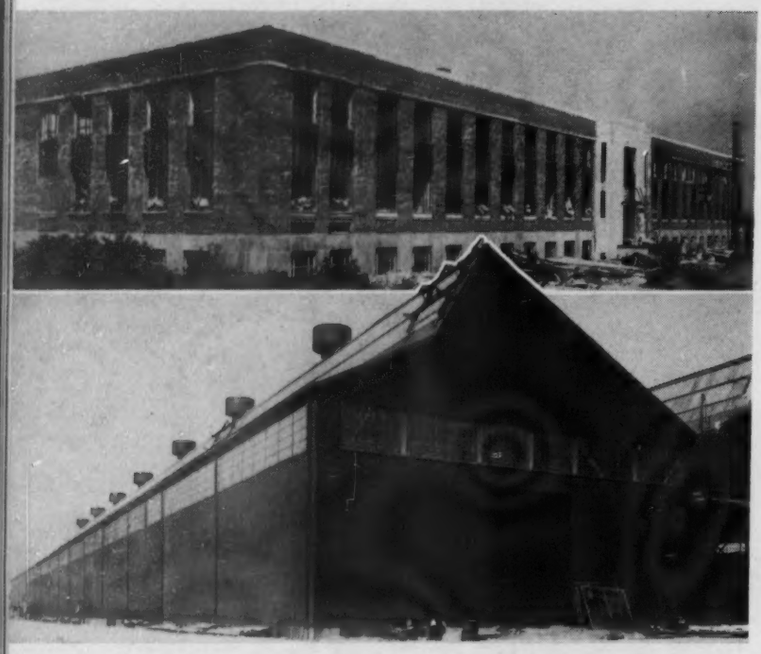
accurately and the rivets were hammered down so flat that a short distance the eye gets the impression of a long continuous tapered tube. Apparently the staff is as sound and perfect as it was when the hand riveters drove the last rivet and descended just before the whistle blew for the end of a working day.

The monument of Moses Cleaveland was erected to face due North. A surveyor's compass rests on his bent left arm while his right hand grasps the staff on which the compass was supported when in use. His uncovered long hair is dressed in a clubbed queue after the fashion of his time. His outer garments consist of a long square cut coat with immense flat pockets on either side, short breeches buttoned at the knee and a pair of long boots rolled at a point a little below the knee-breeches. The head is held erect, one foot slightly advanced, and the entire posture indicates dignity, self-reliance, competency of a man who penetrated 600 miles into the wilderness to lay out a new town.

When Cleaveland and his little party stepped ashore at the mouth of the Cuyahoga River one summer day in 1796, they little realized what a vast fleet would follow them in the years to come or what a dominating place Cleveland was to take in the traffic of the

Unloading machines such as these move millions of tons of iron ore from the hold of lake boats direct to hopper cars. Ore is consumed in Youngstown and Pittsburgh districts





New 2-story modern brick building to house factory offices and the Cleveland district metallurgical departments is nearing completion at the Cuyahoga works of the American Steel & Wire Co. A new 24-bay extension, 576 x 80 feet, to house three new stainless steel pickling lines at the same works is about ready for occupancy

Great Lakes. A view of the 14 miles of lake front protected by the breakwater 5¾ miles long and the harbor amply supplied with docks both along the lake and Cuyahoga river banks, makes it easy to understand how Cleveland meets the demands of the ever-increasing lake business.

The first cargo of iron ore from the Lake Superior region entered the harbor in 1852. At present the entire fleet of 292 iron ore boats are in service. A large percentage of these is managed in Cleveland. Here are the headquarters of the Pittsburgh Steamship Co., the vessels subsidiary of the United States Steel Corp., with 70 boats, and of the Interlake Steamship Co., operated by the Pickands, Mather & Co., in the interests of a number of leading independent iron and steel companies, with 43 units of the great fleet. Six iron ore unloading docks are available in Cleveland, two of these being controlled by railroads exclusively for shipment to interior furnaces.

Since Cleveland is on the direct line between the largest iron ore and the largest soft coal deposits in the world, the iron and steel industry has developed here to a point where Cleveland has come to be called the focal point of "American Ruhr."

In the Cleveland district are 13 modern blast furnaces with an annual capacity of 3,097,700 gross tons of pig iron, three steel plants which account for 3,039,000 gross tons of ingots annually, 692 by-product coke ovens with an annual output of 3,013,000 gross tons and 10 rolling mills which produce a wide range of finished materials.

During the past few years considerable attention has been given the physical condition of plants in

Rolling bars at one of the two merchant mills operated by Republic Steel Corp. at the Corrigan McKinney works

CASTINGS

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Steel castings unmachined, machined, or flame-hardened are produced promptly in our foundries and machine shops to keep your maintenance parts in line with any emergency which may arise in filling *Defense Orders*. The open hearth foundries and the electric steel foundries are set up that special rush orders can be handled promptly without disturbing regular line production . . . Neloy and Neloy-Molybdenum Steel castings are specialized products of the National-Erie Corporation with complete control from the raw material to finished products.

NATIONAL-ERIE

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ERIE, PA., U.S.A.

50-block takeup frame serving the No. 6 patenting furnace at the Cuyahoga works of the American Steel & Wire Co.

the Cleveland district. Strip mills have been widened, blast furnaces remodeled, open-hearth furnaces enlarged, soaking pit capacity increased, and finishing end of mills modernized to handle outbound material more efficiently. At the present time most of the district plants have some sort of a modernization plan in effect. Republic Steel Corp. is laying down a 4-stand, 4-high 54-inch cold strip mill. National Tube Co. at Lorain is rebuilding its No. 3 blast furnace

Iron and Steelmaking Facilities and Output in Cleveland District

Blast Furnaces

Company	Number	Annual capacity, G.T.
American Steel & Wire Co.	2	472,700
National Tube Co.	5	1,215,000
Otis Steel Co.	2	430,000
Republic Steel Corp.	4	980,000
Total	13	3,097,700

By-Product Coke Plants

Company	Number	Annual capacity, G.T.
American Steel & Wire Co.	180	885,000
National Tube Co.	208	1,018,000
Otis Steel Co.	100	320,000
Republic Steel Corp.	204	790,000
Total	692	3,013,000

Steel Plants

Basic Open-Hearth Furnaces

Company	Number	Annual cap., G.T.
National Tube Co.	12	1,116,000
Otis Steel Co.	13	828,000
Republic Steel Corp.	14	1,095,000
Total	39	3,039,000

Rolling Mills

American Steel & Wire Co., wire and wire products and cold strip.

Cleveland Cold Rolling Mills Co., cold rolled strip.

Davey Steel Co., W. H., sheets.

National Tube Co., girder rails, splice bars, skelp, lap and buttweld pipe, seamless tubes.

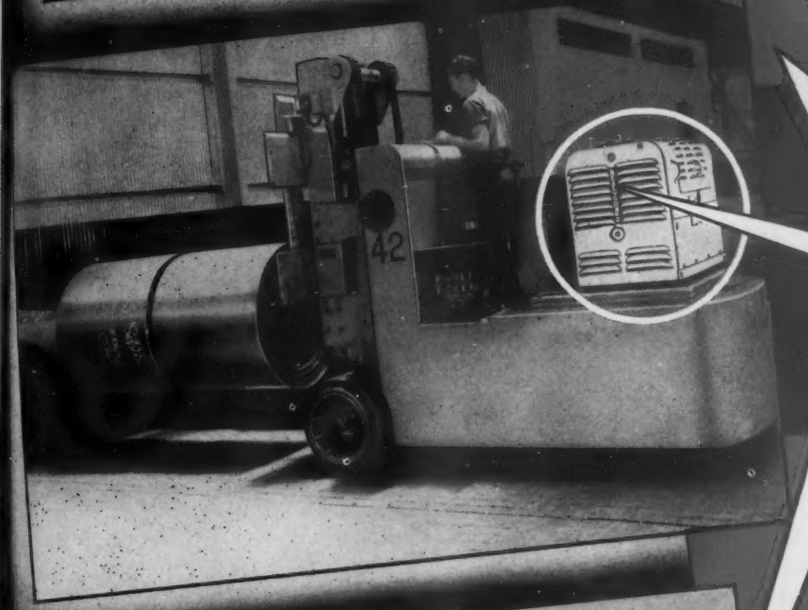
Otis Steel Co., castings, strip, sheets, plates.

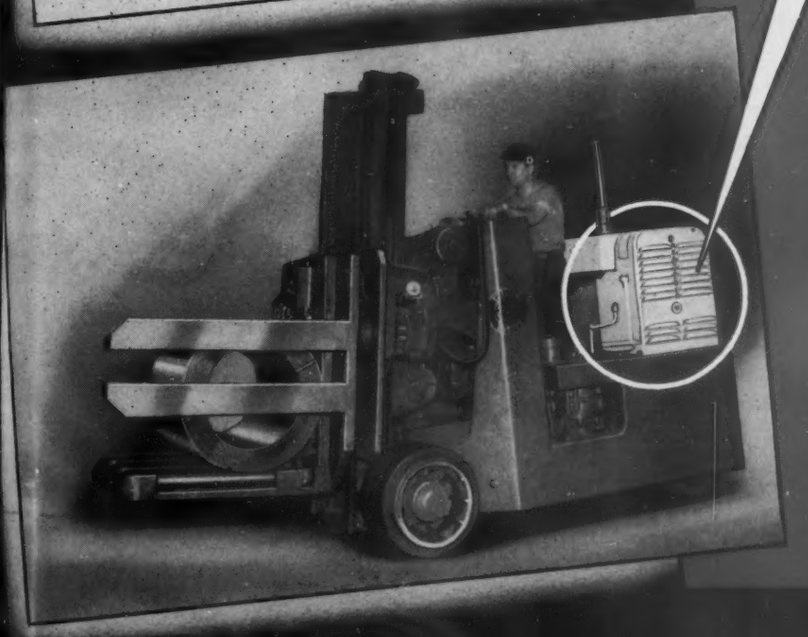
Republic Steel Corp., strip, sheets, bars.

Rolling Capacity of Cleveland District Mills

Units	Number	Annual capacity, G. T.
Blooming	4	2,849,400
Billet	1	750,000
Bar	3	770,000
Skelp	3	385,000
Universal	1	167,000
Rod	6	307,000
Plate, sheared	2	75,000
Buttweld pipe	6	211,000
Lapweld pipe	2	99,800
Seamless	3	510,000
Strip, hot	3	1,443,000
Strip, cold	173	1,271,900
Sheet, hot	11	89,600
Wire blocks	2,503	305,800

READY-POWER





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READY-POWER gives peak performance—continuously—24 hours per day, to the electric industrial truck. This peak performance—"rarin'-to-go-ability"—of Ready-Power is acknowledged by a majority of steel mill men. Today, these qualities are essential as never before. Put (live) READY-POWER to work in this emergency. It will not fail you! READY-POWER has served the STEEL INDUSTRY since 1922. Write or ask for descriptive literature.

IT'S POWER THAT COUNTS!

THE READY-POWER CO.

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CUTTING INTO THE MACHINE TOOL BACKLOG

QUICKLY...

Photo courtesy Jones & Laughlin Steel Corp., Detroit

Four in the time of one — that's the speed with which these machine tool parts are being flame cut from 5/16-inch steel plate with an Airco Travograph Oxyacetylene Cutting Machine. This cutting operation involving 20 lineal inches requires only a little more than a minute. By using a 72 x 240-inch plate, waste motion is practically eliminated—waste material is kept at a minimum—and the 2,400 pieces of this design are quickly cut.

The balance of the order consists of some 14,900 additional tool parts involving three other designs. The usual "changeover" problem vanishes in fast time when the Airco machine gas cutting process is put to work. A duplicate steel cam or templet of each design is its only requirement. The templet guides the magnetic tracing device which in turn directs the motion of the torch.

Many shops are circumventing today's machine tool shortage with the aid of this versatile Airco cutting process. Visible evidence of the variety of shapes, sizes and thicknesses which can be accurately cut in steel is interestingly depicted in the new booklet "Airco Oxygraphs and Travographs". A request on your company letterhead will bring a copy promptly.

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along larger lines for increased pig iron tonnage. Otis Steel Co. has a building program underway which provides for an increase in annealing facilities for sheet and cold rolled strip steel, additional soaking pit capacity, and the installation of a new turbo-blower and high pressure boiler at its blast furnaces. Last year Otis completed the remodeling of its No. 2 blast furnace which prior to that time had operated continuously for a period of ten years. American Steel & Wire Co. at its Cuyahoga works has under construction a 576 x 80-foot building which will house three new stainless steel pickling lines and a modern brick building about ready for occupancy by its factory office department and district chemical and physical laboratories.

A river-extension project which is closely allied with the Office of Production Management's expansion program for the steel industry in Cleveland, is now being considered by the House Rivers and Harbors committee. The project involves a 1500-foot extension of navigation in the Cuyahoga where additional deep water is needed to provide access to a projected new defense plant site of the Republic Steel Corp. as well as to provide additional stockage and storage space for the Otis Steel Co.

The extension under consideration runs from the present head of navigation from the Otis Steel Co.'s Riverside plant to the parallel bridges of the Wheeling & Lake Erie and Newburgh & South Shore railroad. If favorable action is taken, water transportation will then be provided to the 36-acre plot of land which the Republic company has acquired from the Universal Atlas Cement Co. and on which it may construct two modern blast furnaces under the OPM expansion program.

Across the river from this 36-acre plot of land the Otis Steel Co. has land on which a pier will be constructed for storing iron ore, limestone and scrap. At present its dock is badly congested in handling enough material for current operations and it is anticipated that it will be necessary to increase facilities to handle raw materials which carries the plant over the closed navigation period.

Charging machine inserting a box of raw material into one of the charging doors of an open-hearth furnace at the Corrigan McKinney works of the Republic Steel Corp.

For Industries

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The group-drive feature of Foxboro Potentiometer Controllers enables initial economy without slightest reduction in efficiency. A single motor drives up to 8 instruments!

Foxboro Potentiometer Controllers Help Offset the Skilled-Man Shortage!

These days, anything that saves trained manpower for jobs where it *can't* be replaced, is a vital aid to defense production.

That is why so many industries are re-ordering Foxboro Potentiometer Controllers *by preference* after comparing results of original installations. These labor-saving pyrometers not only enable precision operation of high-temperature processes by newly-trained men . . . but relieve short-handed instrument crews. Pyrometer maintenance is reduced to routine inspection and standardization!

A look inside shows why. Every detail is designed for utmost simplicity . . . to make precision operation certain . . . to eliminate maintenance trouble. For instance, a unique advance is the Foxboro fixed slide-wire contact. This makes possible knife-edge detection, and the use of large trouble-proof parts. Another typical advantage to the new operator is the extra-large setting-dial that makes precision setting as easy as tuning a radio!

Get the full story . . . write for Bulletin 202-3. **The Foxboro Company, 118 Neponset Avenue, Foxboro, Massachusetts, U. S. A.** Branches in principal cities of United States and Canada.

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PRODUCTS

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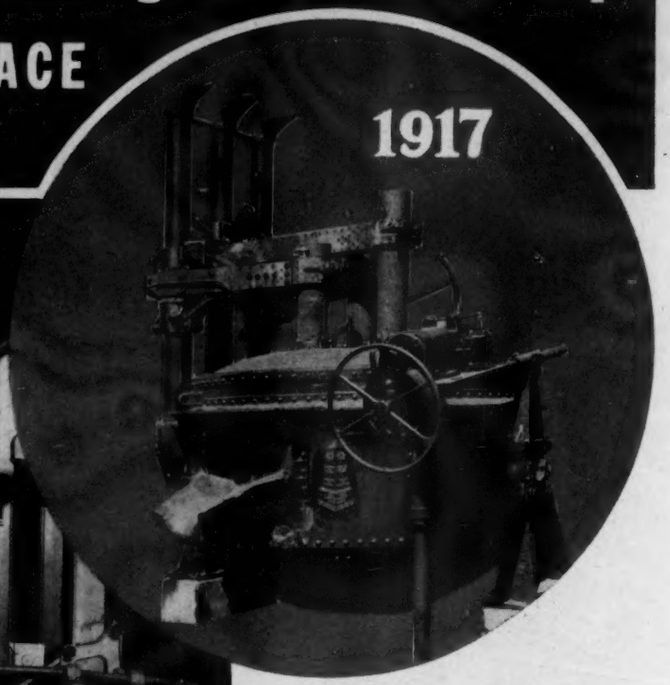
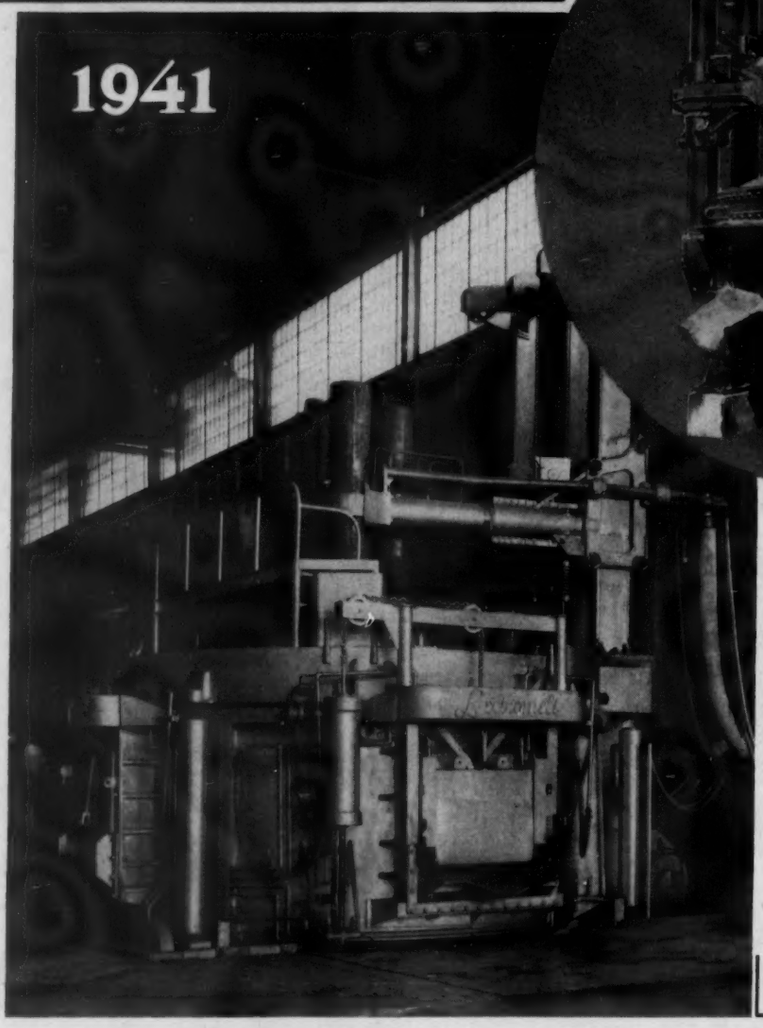
- Automatic Pilers
- Uncoiling Units.
- Press Feeding Equipment.
- Slitters.
- Strip Uncoiling and Automatic Shearing Units.
- Strip Coil Holders.
- Strip Coiling Reels.
- Sheet Galvanizing Equipment.
- Automatic Tinning Equipment.
- Automatic Doublers.
- Normalizing Furnaces.
- McKay Levellers and Processing Units.
- Strip Welding Equipment.
- Continuous Strip Pickling Equipment including: Uncoilers, Up-Cut Shears, Stitching Machines, Pinch Roll Units, Recoilers, Drying Machines, Pickling Tanks, and Auxiliary Equipment.
- Scrubbing, Leveling, and Oiling Machines for Flat Products.
- Wilson Vertical Tube Type Annealing Furnaces.
- Corrugated Inner Covers.
- Automatic Feeding and Catching Tables.
- Continuous Pack and Pair Heating Furnaces.
- Wheelabrator Abrasive Cleaning Equipment.
- Automatic Weight Classifier.
- Automatic Gauge Classifier.

SPECIALISTS IN SHEET, TIN AND STRIP MILL EQUIPMENT

25 years experience goes into every *Lectromelt* FURNACE





Pictured at left is the largest top charge electric furnace in the United States. This 50-ton Moore Rapid LECTROMELT furnace is in operation at the Copperweld Steel Company, Warren, Ohio and represents the most advanced construction in the electric furnace field.

Illustrated above is one of the first Moore Rapid LECTROMELT furnaces manufactured by this Company in 1917. It was operated for 15 years, melting 111,436 tons and was replaced by a top charge LECTROMELT. When installed it was the last word but it is now a relic and a monument to progress.

LECTRO LECTROMELT LECTROMELT LE

Because we are celebrating our 25th anniversary we feel that we can not take better stock of ourselves than by comparing the earliest and the latest LECTROMELTS. In other centuries a span of 25 years would see little change; in this century 25 years frequently means the difference between obsolescence and modernity. Moore Rapid LECTROMELT furnaces, both top charge and door charge types are built in standard sizes ranging from 100 tons down to 25 lbs. capacity. The experience we have gained in 25 years serves us well because it enables us to serve efficiently all who melt and produce steel, iron, ferro-alloys, calcium carbide, etc. Write us for details on LECTROMELT equipment to meet your requirements.

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH, PENNSYLVANIA

Assigned to DEFENSE PRODUCTION

PERISCOPE TUBES AND GUN BARRELS AS WELL AS ROLLS ARE GROUND IN

FARREL ROLL GRINDERS

The design, productivity and operating precision of Farrel Heavy Duty Roll Grinders make them readily useful to some of the unusual needs of defense production.

The machine illustrated above is a standard 28″ roll grinder fitted to grind stainless steel tubes for submarine periscopes. These tubes are ground to tolerances of .002″ in concentricity (measured on the diameter) and .005″ in straightness for their full length. These are close tolerances for such long, slender, easily deflected tubes and their attainment in continuous daily operation is evidence of the utmost precision in the design and construction of Farrel Grinders.

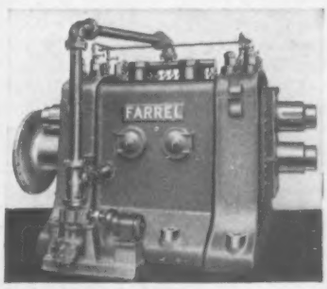
Other Farrel Heavy Duty Roll Grinders are performing similar precision jobs, such as grinding the jacket fits on the barrels of 155 mm. guns.

Periscopes, gun barrels and similar cylindrical work, as well as rolls of any type—concave, convex or straight—can be ground with speed and accuracy in Farrel Heavy Duty Roll Grinders. Automatic and semi-automatic features, finger-tip control from the operator's station, and built-in accuracy facilitate operation and minimize dependence on the operator's skill. For all types of product to which it is adapted, on any materials, for either heavy roughing cuts or the finest finish, the Farrel Heavy Duty Roll Grinder gives positive control of accuracy to predetermined standards, with capacity for sustained high output.

Most of the capacity of the three Farrel-Birmingham plants is devoted to the production of machinery and equipment essential to the national defense program. Included in this defense production are Farrel-Sykes Gears and Drives for rolling mill service, of which a few typical units are illustrated at the right.

Double Reduction Gear Unit with Integral 44″ Pinion Stand for 40″ x 168″ Reversing Mill.

4000 HP Pinion Stand for Four-High Reversing Cold Strip Finishing Mill.



Farrel-Sykes Continuous Tooth Herringbone Gear for Rolling Mill Drive, 184.78″ outside diameter.

FARREL
REG. U.S. PAT. OFF.

FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.

New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

• Trantinyl Guides in Bar Mill at Aliquippa plant of Jones and Laughlin.

Below:—Shoe of Trantinyl in J & L Tube Mill at Aliquippa . . . Trantinyl Rolling Mill Plugs, also used by J & L not shown in this photo.

•

Take a lesson in SELF DEFENSE!

ROLL MORE TONNAGE
MAINTAIN HIGH QUALITY
REDUCE TONNAGE COSTS

Everything is Defense. Try a little on your own. Defend your company against rising costs, slow production. Defend yourself against the arched eyebrows or worse of "Mahogany Row". Take a practical, proven lesson from plants that maintain high quality, high tonnage with attendant low tonnage costs, from plants that have increased tonnage, reduced change-over time, and reduced scrap by eliminating scratches due to "pickup."

Scratch free, cast to size, extremely long life Trantinyl guides, plugs, shoes have helped mills that have a reputation for very high quality to simultaneously produce that quality at lowest cost per ton. These are not mere words. Let us tell you how the development of Trantinyl has eliminated the old 12 to 16 changes of guide shoes per turn, how it has increased undelayed output up to an average of 6000 passes to a plug. The story means tonnage and dollars to the company, tonnage income to you and much, very much, less operating grief. Why not ask about Trantinyl?

BACKED BY 24 YEARS FOUNDRY METALLURGICAL EXPERIENCE

TRANTINYL QUALITY DISTINCTION

OTHER TRANTINYL TONNAGE RECORD BREAKERS

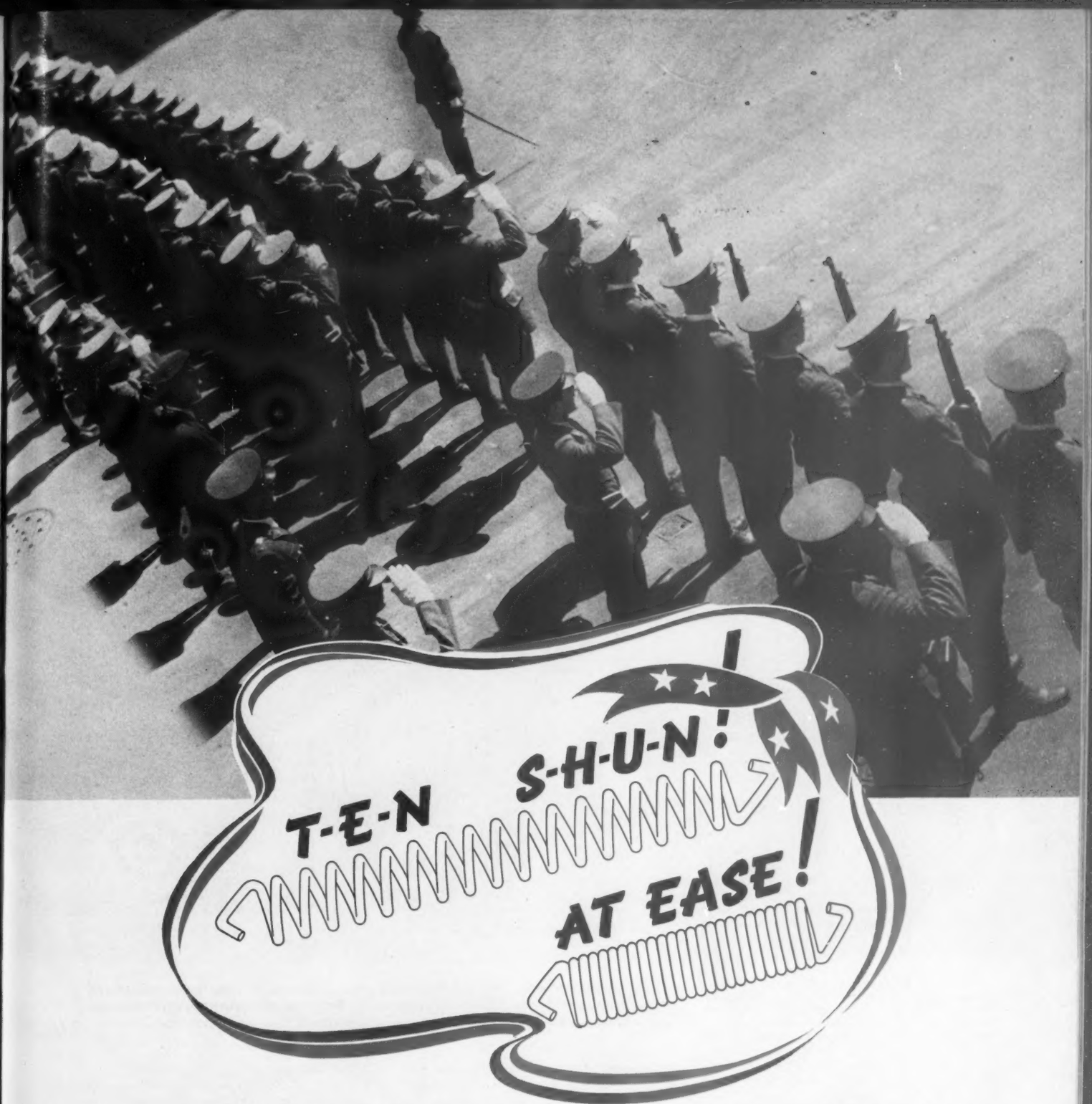
Seamless Tube: Guide Shoes, Rolling Mill Plugs, Stripper Guides. **Bar Mills:** Guides, Rollers. **Hoop Mills:** Slitter Guides, Feed Rollers. **Billet Mills:** Rollers, Guides. **Strip Mills:** Guides, Uncoiler Wearing Plates (Cold Strip). **Shape Mills:** Rollers, Guides. **Welded Pipe:** Rolls.

Also—Conveyor Rollers, Tool Holders, Bolsters, Spindles.

Elimination of machine work by precision casting methods.

YOUNGSTOWN ALLOY CASTING CORPORATION

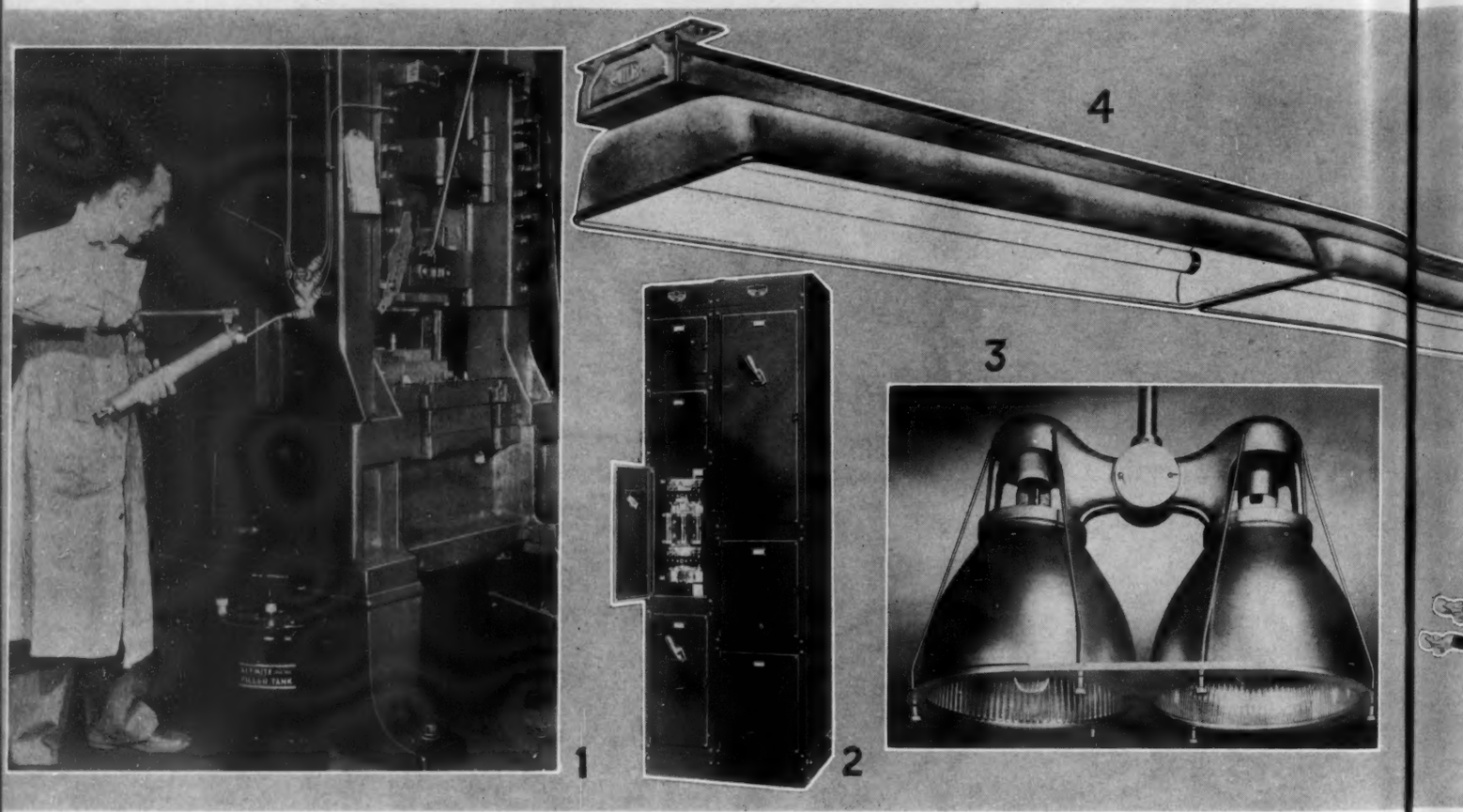
Youngstown, Ohio, U.S.A.



. . . Simple commands, both, when dealing with a military group or wherever the human element is involved—but to a cold, mechanical unit of coiled wire, *TENSION* or even *COMPRESSION* forces do not always respond to the *AT EASE* signal. Springs that are not selected for the specific task; that lack true metallurgical composition or proper heat treatment are likely to take on a "set" or change of dimensions . . . Lee-Built "SCIENTECH" Springs (founded on The Science of Spring Design plus the Technique of Spring Building), whether of the Compression, Extension, Torsion or Clock type—or the commonly termed Flat Springs and Wire Forms, are capable of taking the enduring *commands* that are likely to be imposed upon them in defense production and possess the mettle to *relax* efficiently when conditions repair to normalcy.

LEE SPRING COMPANY, INC.
30 MAIN STREET BROOKLYN, N. Y.

Manufacturers to Exhibit Products at Exposition



1. Lubricating system, Stewart-Warner Corp., Chicago. 2. Sectionalized motor control, Cutler-Hammer Inc., Milwaukee. 3. National defense unit, Holophane Co., New York. 4. Fluorescent lighting, 50-footer, Miller Co., Meriden, Conn.

ALEMITE DIVISION, STEWART-WARNER CORP., Chicago. Booth 101.—Exhibit will consist of a complete line of industrial lubricants, lubrication fittings and lubrication guns as well as the new Alemite progressive system of lubrication. All equipment will be shown in operation. Attending will be C. I. Kraus, D. L. Stewart, J. M. Seanor, W. D. Grannan, F. E. Sage, and Walter Ottinger.

ALUMINUM CO. OF AMERICA, Pittsburgh. Booths 81, 82.—Exhibiting Alcoa aluminum bus conductors (flats and channels) used in steel mills. A Lectrodryer used in controlling the humidity of annealing furnace atmospheres, various mesh sizes of Alorco activated alumina used for drying air and other gases, for revivifying transformer oils, and for protecting polished and brightened steel from the effects of moist air in transit, also will be on display. Attending will be F. R. Dallye.

AMERICAN AIR FILTER CO., INC., Louisville, Ky. Booths 98, 99.—Display will include latest design of air filters and dust control equipment. Attending will be J. R. McConnell, H. W. Pound, H. J. Noles, F. K. Minor, and J. D. Reed.

AMERICAN CAR & FOUNDRY CO., New York. Booths 11, 12.—Exhibiting an electric rivet heater, a fully-automatic heater, and a horizontal "C" heater of the Berwick type. Representatives will include F. C. Cheston, H. C. Cheston and W. J. Bisset.

AMSLER-MORTON CO., Pittsburgh. Booths 22, 23.—Exhibiting illustrations of furnaces of its own design and manufacture, as well as recuperation as applied to heating furnaces. In attendance will be W. A. Morton, P. M. Offill, R. C. Whitney, and C. F. Herington.

ASKANIA REGULATOR CO., Chicago. Booths 64, 65.—Exhibit will center around a new development called "summarizing gear" which consists of a means of summarizing more than one fuel and providing a means of automatically controlling air supply in relation to these fuel flows. Various schematic diagrams will be available. Attending will be H. J. Velten, H. Ziebolz, C. E. Hague, F. Bloom, W. F. Pray, F. E. Early, C. Hayden, E. R. Engstrom, and J. C. Vaaler.

CADMAN MFG. CO., A. W., Pittsburgh. Booth 115.—Exhibit will include a complete line of the company's bearing materials including Bearite, Acorn, Nicuite, and Cupaloy as well as copper electrodes. Attending will be A. M. Cadman, C. A. Marlowe, P. Wendt, and M. Wendt.

BARRETT-CRAVENS CO., Chicago. Booth 5.—A lift truck, a lift-truck platform and an elevator will be available for inspection. Representing the company will be E. J. Heimer, O. L. Jenkins and H. C. Morrison.

BENJAMIN ELECTRIC MFG. CO., Des Plaines, Ill. Booths 102, 103.—Exhibiting lighting equipment for factories, mills and other industrial locations including fluorescent units, floodlights and a new fluorescent unit for type RF lamp. Attending will be C. B. Harlow, R. C. Mons, R. Campbell, and C. Ostrom.

BLAW-KNOX CO., Blawnox, Pa. Booths 66, 67.—An artist will be on hand to draw caricatures of visitors and these sketches will be projected on a large screen. The drawings will then be framed and presented to the subjects with the compliments of the company.

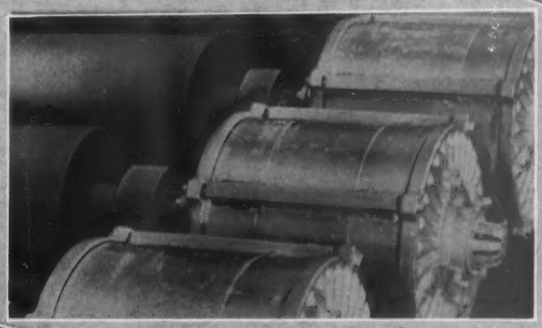
CLARK CONTROLLER CO., Cleveland. Booths 19, 19A, 20, 20A.—Will exhibit several specially built display boards on which will be mounted foot switches,

Exposition Hours

Tuesday, Sept. 23—9:00 *a.m.* to 10:00 *p.m.*

Wednesday, Sept. 24—9:00 *a.m.* to 10:00 *p.m.*

Thursday, Sept. 25—9:00 *a.m.* to 10:00 *p.m.*



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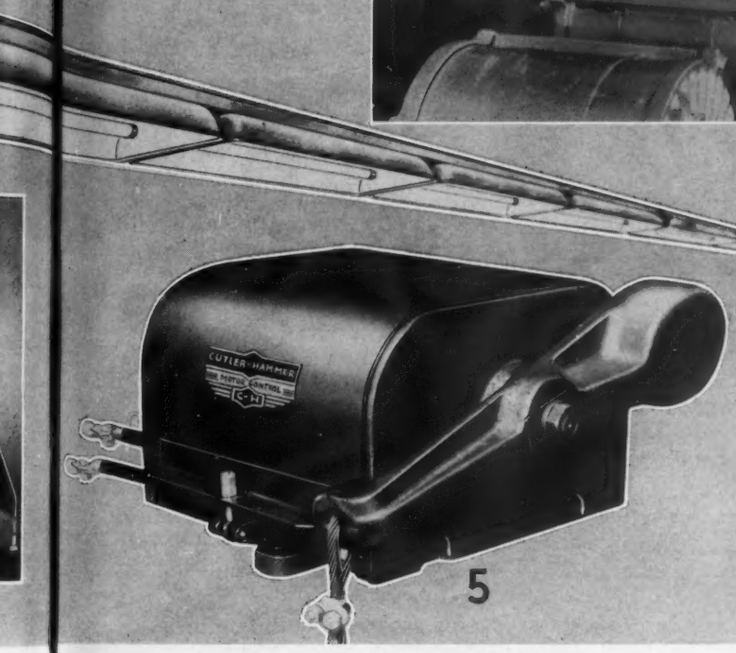

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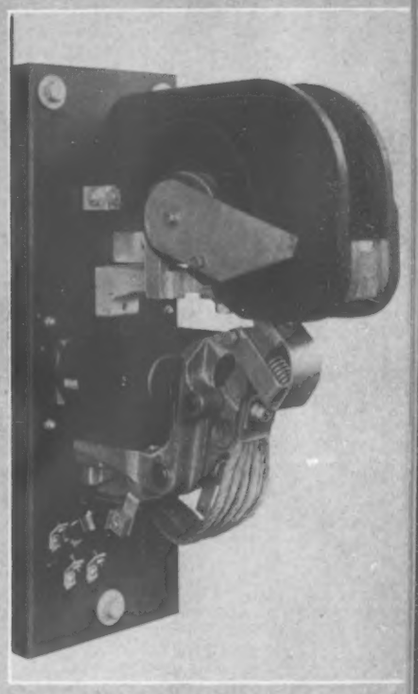

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5. Crane limit stop, Cutler-Hammer Inc. 6. Floating motor drive, Reliance Electric & Engineering Co., Cleveland. 7. Valves, Homestead Valve Mfg. Co., Coraopolis, Pa. 8. New contactor, Electric Controller & Mfg. Co., Cleveland

cam limit switches, hatchway limit switches, mill master switches. Each will feature the fact that the same moving finger contact mechanism is interchangeable in all units. Another panel will demonstrate a new counter-weighted truck contactor. In addition revised panels of alternating-current and direct-current contactors, type-D push buttons and a relay panel will be displayed. Representatives of the company will include W. H. Williams, L. A. Watson, R. Ranson, J. J. Mellon, R. L. Puette, O. M. Bundy, G. W. First, E. R. Jung, O. L. Holcombe, T. E. Beasley, D. L. Orton, H. King, H. J. Fisher, L. H. Colbert, and G. W. Peters.

CLEVELAND CRANE & ENGINEERING CO., Wickliffe, O. Booth 127.—Exhibit will consist of photographs and appropriate background display. Attending will be H. T. Florence, C. H. Saiter, R. G. Birkin, K. C. Slater, R. S. Howell, F. H. Gill, and C. L. Peterson.

CLEVELAND WORM & GEAR CO., Cleveland. Booths 143, 144, 145.

CUNO ENGINEERING CORP., Meriden, Conn. Booths 125, 126.—Exhibiting Cuno continuously cleaning filters for steel mill lubricating systems, water coolants, hydraulic and descaling systems and systems for fuel and miscellaneous processing liquids. In operation will be the FKR Cuno Flo-Klean filter for steel mill service. In attendance will be C. H. Cuno, S. L. Wolfson, D. H. Van Vleck, C. A. Lind, C. H. Winslow, N. W. Fuller, H. W. Munday, R. M. Booth, F. J. Ursem, W. A. Ursem, J. N. Fauver, C. S. Abbott, A. . King, N. L. DeLear, G. C. Halwas, S. Gross, G. P. Dempler, H. T. Weeks, R. P. Dempler, and W. J. O'Brien.

CUTLER-HAMMER INC., Milwaukee. Booths 46, 47, 58, 59.—Exhibit will consist of a display of modern steel mill control including a new crane safety limit stop, Unitrol sectionalized control center, an LTL crane control panel, and a colored movie of the world's largest lifting magnet in action. All equipment will be operating. Representatives in attendance will include B. M. Horter, L. P. Niessen, E. G. Peterson, J. M. Newman, E. W. Seeger, P. B. Harwood, E. J. Posselt, K. H. Melzer, R. J. Eckstein, H. E. Ball, H. W. Eastwood, F. J. Burd, H. E. Ankeney, C. J. Maloney, E. F. Weiss, B. L. Donahue, E. J. Gove, F. S. Horner, C. J. Quammen, T. S. Towle, O. P. Robinson, and E. L. Windenberg.

DIXON CRUCIBLE CO., JOSEPH, Jersey City, N. J. Booth 110.—Products supplied to the steel industry including graphite lubricants, dry graphites, crucibles, stopper heads, and graphite paints will be exhibited. Attending will be E. S. Glauch, R. E. Goodfriend, and E. C. Bleam.

ELECTRIC CONTROLLER & MFG. CO., Cleveland. Booths 138, 139, 140, 141.—Exhibiting new No. 4 line-arc magnetic contactor, standard controllers for both mill and crane duty, a Neo-time direct-current motor starter, contactors for resistance welding, a 2300-volt starter with fuse type disconnect switches, and other electric motor control and equipment. Attending will be R. M. Phillips, C. D. McCord and J. P. Moore.

ELECTRIC STORAGE BATTERY CO., Philadelphia. Booth 117.—An Exide discharge indicator and an Exide charge control unit will supplement the company's exhibit of industrial truck batteries. Cutaway cells of three types of the company's batteries as well as other

type cells in glass jars will be available for inspection. Attending will be W. Van C. Brandt, W. Ely, G. V. Cripps, W. G. Chaney, C. J. Moore, J. M. Garroway, H. V. Allen, and W. Mussen.

ELWELL-PARKER ELECTRIC CO., Cleveland. Booths 148, 149.—Exhibit will include power industrial trucks and translite photos of various operations. In attendance will be G. W. Brown, C. B. Cook, W. A. Meddick, C. E. Cochran, F. H. Gill, F. J. Avery, T. Parlon, R. W. Sanborn, W. H. Leahy, J. P. Lyons, R. F. Crawford, H. G. Mouat, J. M. Hawkins, O. R. Heidenrich, W. F. Hahn, F. E. Price, F. Colker, E. G. Landes, E. H. Wood, C. L. Obersheimer, J. F. B. Meikle, T. P. Wyman, J. P. Ascher, G. J. McLernon, F. D. Quinn, G. E. Kent, W. M. Lyman, W. L. Kammerer, E. L. Hughes, W. C. Bryan, L. E. Stewart and J. L. Herchelroth.

FARVAL CORP., CLEVELAND. Booths 143, 144, 145.—Exhibiting an operating display of the Farval Dualine centralized system of lubrication and its parts, including cutaway sections to show the principle of operatioin and details of construction. An attractive photomontage will illustrate typical installations of Farval systems on steel mill equipment. A. J. Jennings and other executives from Cleveland, Chicago, Detroit, Pittsburgh and Philadelphia offices will attend. As usual, the Farval exhibit will be combined with that of the Cleveland Worm & Gear Co.

FULTON FOUNDRY & MACHINE CO., INC., Cleveland. Booth 108.—Exhibit will include the uses of Meehanite in the light of present engineering needs. Attending will be J. C. Beattie, H. Huff, A. C. Denison and F. L. Barton.

GARLOCK PACKING CO., Palmyra, N. Y. Booth 14.—A line of mechanical packings for steel plant service and Garlock Klozures will be displayed. Attending will be P. Arnold, F. E. Eriandson, and F. Wilders.

GENERAL ELECTRIC CO., Schenectady, N. Y. Booths 68, 69, 71, 72, 73.—Exhibit will stress newer developments in electric equipment, and how steel production can be increased when this equipment for a mill is properly co-ordinated. Various photographic reproductions will show what General Electric Co. has done in applying correct types of equipment to problems encountered. Operating demonstrations of amplidyne and thyratron controls, and switchgear will be presented. Tri-clad motors and a small model of an industrial type diesel-electric locomotive will be displayed. Representatives will include J. E. N. Hume, J. J. Huether, E. S. Murrah, H. W. Poole and L. A. Umansky.

GRAYBAR ELECTRIC CO., INC., Cleveland. Booth 80.—Exhibit will include newly developed hi-powered communication equipment for steel mills and industrial plants. Representing the company will be R. F. Grossett, J. G. McNeilly, R. F. Briggs, and F. C. Millard.

HOLOPHANE CO., INC., New York. Booth 111.—Exhibit will include industrial lighting equipment for steel mills. A new unit, the "National Defense Unit" will be on display for the first time. Equipment for protective lighting also will be featured. Attending will be D. H. Tuck, H. R. Thompson, and C. C. Pickell.

HOMESTEAD VALVE MFG. CO., INC., Coraopolis, Pa. Booth 8.—Exhibit will include two new products of the company namely, model JL Hypressure Jenny steam cleaner and a new line of cast steel lever-sealed valves for 150 pounds working pressure. Those in attendance will include F. E. Schuchman, B. F. Schuchman, A. J. Pugh, and G. T. Dean.

HYATT BEARINGS DIVISION, GENERAL MOTORS SALES CORP., Harrison, N. J. Booths 24, 25.—Exhibiting a complete range of types and sizes of roller bearings for tables, cars, cranes, motors and auxiliary steel mill equipment. Attending will be J. M. Kelly, L. L. Hill, H. E. McGoff, M. B. Barbe, C. L. Newby, R. F. Wilson, H. K. Porter, H. M. Carroll, and E. P. O'Neill.

I-T-E CIRCUIT BREAKER CO., Philadelphia. Booths 60, 61.—Exhibiting new type KB circuit breaker as well as type KA circuit breaker. Part assemblies of both types will be exhibited on a panel. Those attending will be W. Deans, R. Murphy, D. Baker, W. Ernwood, H. Fisher, R. Cox, R. Horne, M. Horne, L. Morrow, R. Brown, J. Eshelman, L. Scanlon, S. Currier, E. Schmidt, R. Lockett, O. M. Bercaw and R. Bock.

JEFFERSON ELECTRIC CO., Bellwood, Ill. Booth 21.—Exhibiting its own products including general purpose and specialty transformers, fluorescent lamp control equipment, fuse products, temperature controls, Ferro-Tube mercury contacts, and radio products. Attending will be F. H. Pickerill.

KEYSTONE LUBRICATING CO., Philadelphia. Booth 1.—Several interesting moving displays will be shown. Attending will be V. Berguson, O. V. Schauer, C. Berguson, C. E. Stotz, and F. H. Ehnts.

THE LINDE AIR PRODUCTS CO., New York. Booths 94, 95.—On display will be photographic transparencies showing representative operations in which the oxyacetylene process is used, such as furnace tapping and scrapping operations with the oxygen lance; shape-cutting of steel by oxyacetylene cutting machines; bloom conditioning with the Lin-de-Surfacer steel-conditioning machine; billet preparation with the hand-deseaming blowpipe; the multiple shell billet cut-off operation; automatic tube welding for continuous tubing; and the Unionmelt automatic electric welding process. Specimens of flame-cut billets and shapes will also be shown.

MERCURY MFG. CO., Chicago. Booth 118.—Exhibit will be confined to small scale models of industrial trucks, tractors and trailers made by the company as well as blow-up pictures of installations in steel mills. Those in attendance will include L. F. Meissner, Jr., J. R. Lewis, and T. W. Barnes.

MILLER CO., Meriden, Conn. Booths 131, 132.—Fluorescent lighting equipment will be displayed. In operation will be shown 50 Foot Candler and Troffer continuous wireway fluorescent lighting systems. Attending will be P. C. Keller.

MORGAN CONSTRUCTION CO., Worcester, Mass. Booth 112. —This booth will be fitted up as a restroom and those attending the exposition are invited to make it their headquarters.

MORGAN ENGINEERING CO., Alliance, O. Booths 76, 77.—Exhibit will consist of a built-up illuminated panel with enlargements showing different lines manufactured by the company.

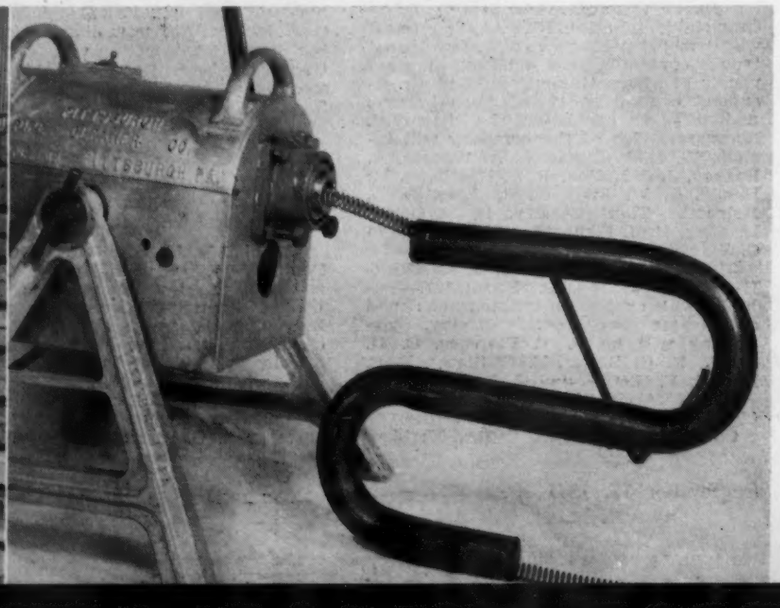
MORGANITE BRUSH CO., INC., Long Island City, N. Y. Booth 57.—Carbon, graphite and copper graphite brushes will be on display. Those attending will include E. E. Smith, T. U. Franklin, H. E. Doolittle, and J. F. Drummey.

NATIONAL CARBON CO., INC., Cleveland. Booths 44, 45.—Exhibiting carbon and graphite products which find application in the iron and steel industry including brushes and contacts for electrical equipment, mercury arc rectifier anodes and grids, linings for pickling tanks, brick and tile, miniature electrostatic precipitator, model gas tank heater unit (in operation), circular tower section, bayonet and return bend type heat exchangers, trays, ingot molds, mold plugs, pipe and fittings, valves, and raschig rings. In attendance will be G. A. Blackburn, N. F. Bowman, A. C. Bryan, C. J. Chapman, J. S. Copley, Dr. M. J. Dorcas, M. B. Farrar, J. A. Hammond, G. H. Mayer, Jr., T. R. Moore, and V. J. Nolan.

NATIONAL ELECTRIC COIL CO., Columbus, O. Booths 55, 56.—Will have an activated display intended to represent the company's ability to manufacture electric coils for motors and generators for the steel, mining, utility, and other industries. Samples of products made by the company also will be available for inspection. Attending will be Bailey Price.

NATIONAL ELECTRIC PRODUCTS CORP., Pittsburgh. Booth 49.—Display of this company will consist of certain industrial equipment including a section of National I.P.I. busway, one section of

Left, telescopic lift with a capacity of 6000 pounds for speedy lifting, carrying, stacking and spotting multiton loads. Towmotor Co., Cleveland. Right, pipe cleaning machine, Pittsburgh Pipe Cleaner Co., Pittsburgh



WHITCOMB LOCOMOTIVES

Rugged Economical Service

WHITCOMB LOCOMOTIVES today are the cumulation of 35 years constant effort and study in improvement of locomotive design and workmanship. Every increasing demand for power, smoothness or economy has found that **WHITCOMB** engineers had anticipated that requirement with the result that today **WHITCOMB** locomotives deliver power far above rated capacities and at maintenance and operating costs that are a revelation. **WHITCOMB'S** hydraulic drive speeds up operation, greatly reduces shocks and prevents engine stalling. **A WHITCOMB LOCOMOTIVE** can do your hauling job and at lower costs to you.

BLW
THE BALDWIN GROUP

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILL.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

DO YOU HAVE THE FACTS ON THIS COMPLETE LINE of J-M Insulating Brick and Insulating Fire Brick?

SIL-O-CEL NATURAL INSULATING BRICK	SIL-O-CEL C-22 INSULATING BRICK	SIL-O-CEL SUPER INSULATING BRICK	JM-16 INSULATING FIRE BRICK	JM-20 INSULATING FIRE BRICK	JM-23 INSULATING FIRE BRICK	JM-26 INSULATING FIRE BRICK
Back Up—1600°F	Back Up—2000° F.	Back Up—2500° F.	Back Up—2000° F. Exposed—1600° F.	Back Up—2000° F. Exposed—2000° F.	Back Up—2300° F. Exposed—2300° F.	Back Up—2600° F. Exposed—2600° F.

NOW, with the recent addition of three *new* brick, the J-M Line includes seven insulating brick and insulating fire brick—each designed for a specific temperature and service. Like all J-M Insulating Materials, they can be relied upon for dependable performance under severe operating conditions.

For a complete description of the properties and characteristics of these seven Johns-Manville Brick, ask for folder IN-91A. Johns-Manville, 22 E. 40th Street, New York, N. Y.

Service Recommendations for J-M Brick

Here is a partial list of the many types of furnaces and equipment where the seven Johns-Manville Brick shown on this page are recommended for use as insulating fire brick or as insulating brick behind a refractory lining:

Annealing Furnaces
Bake Ovens
Bustle Pipes
Carburizing Furnaces
Case Hardening Furnaces
Drawing Furnaces
Electric Furnaces
Flues
Forge Furnaces
Gas Producers
Galvanizing and Tinning Furnaces
Hardening Furnaces
Hot Blast Mains
Hot Blast Stoves
Heat Treating Furnaces
Incinerators
Japanning Ovens
Normalizing Furnaces
Open Hearth Furnaces
Oil Heaters and Stills
Producer Gas Mains
Recuperators
Regenerators
Retorts
Radiant Tube Annealing Covers
Soaking Pits
Stress Relieving Furnaces
Stacks
Salt Bath Furnaces

All J-M Insulating Brick and Insulating Fire Brick furnished accurately sized in standard 9" shapes of the 2½" and 3" series, and in special sizes.

JM PRODUCTS

Johns-Manville INDUSTRIAL INSULATIONS

For every temperature . . . for every service

4 x 4-inch Wirewa, and a display board showing an assembly of NE Gorilla grip connectors. None of this equipment will be in active operation. Attending will be J. E. Huguelet and H. E. Dozer.

OTIS ELEVATOR CO., New York. Booth 89.—Booth will be fitted up as a meeting place for company friends. Photographs of the latest type of furnace hoists and sales folders dealing with bell hoists will be available. Attending will be E. F. Saunders and J. L. Howe.

PENNSYLVANIA ELECTRIC COIL CORP., Pittsburgh. Booth 130.—Armature coils, field coils and electrical insulating materials will be shown. Attending will be K. Green, F. J. McKernan, J. P. Vins, E. Flowers, M. W. Cobbledick, and R. Close.

PHILCO CORP. (Storage Battery Division) Philadelphia. Booth 133.—Individual type batteries and a special high-capacity cell will be on display. Representatives in attendance will include M. W. Heinritz, P. S. Harvey, E. J. Ahlhauser, W. D. Hess, C. W. Hanna and E. H. Boyer.

PITTSBURGH PIPE CLEANER CO., Pittsburgh. Booth 120.—Exhibiting machine for cleaning pipe from ¼ to 12-inch inside diameter, hydraulic machine for cleaning water pipe or other pressure lines from 6 to 48-inch inside diameter pipe, mechanical electric driven pipe cleaning machines (in operation) cleaning ⅛ to 2-inch inside diameter U-turns. Attending will be L. R. Robinson, K. I. Robinson, and E. O. Berger.

POST-GLOVER ELECTRIC CO., Cincinnati. Booth 83.—Displaying its steel grid resistors which will consist of standard unit banks for general service, resistors for internal mounting for face plate controllers, and resistors for use with limit switches. In addition will be shown electric heaters for use in crane cabs and other hard to heat places. Attending will be C. E. Nuckels, E. A. Vosmer, Jr., M. A. DuBois, T. R. Gano, and R. W. Houp.

RELIANCE ELECTRIC & ENGINEERING CO., Cleveland. Booths 51, 52, 53, 54.—Displaying its new floating motor drive which was described in the Aug. 25 issue of STEEL, p. 70. Motor will be shown driving a miniature roll, which is an exact duplicate of a recent installation. Busses will be available to transport visitors to the company's plant during the day where new motor generators and the V-S drive will be shown. Attending will be C. L. Collens, H. M. Hitchcock, A. M. MacCutcheon, J. W. Corey, B. V. Ballard, R. O. Herbig, E. E. Helm, W. W. Spangel, R. A. McDowell, A. L. Lemon, C. V. Gregory, A. A. Proudfoot, A. L. Pollard, C. R. Newpher, H. J. Thompson, C. P. Lohr, R. A. Geuder, and W. H. Compton.

ROLLWAY BEARING CO., Inc., Syracuse, N. Y. Booths 6, 7.—Display will include either actual bearings or large photographs of 28 distinctly separate types of Rollway precision radial bearings in both single and double widths and six types of Rollway precision thrust bearings. Attending will be H. F. Hodgkins, H. A. Pierce, W. B. Smithers, J. E. Sero, S. Farrell, B. M. Judson, and W. C Schloskey.

SKF INDUSTRIES, INC., Philadelphia. Booths 90, 91.—A large bearing just off the production lines in Philadelphia weighing 3700 pounds and built for roll necks 112 inches wide for a 4-high aluminum mill will be displayed. Attending will be R. H. DeMott, R. C. Byler, A. S. Murray, V. A. Menaglia, P. T. Hopper, R. S. Baines, J. B. Castino, P. A. Carlson, O. Neumer, M. Middleton, W. Jetter, and M. W. Passmore.

SPEER CARBON CO., Saint Marys, Pa. Booth 4.—Will exhibit a general line of carbon products. Representatives will include M. S. May, J. P. Hutcheson, J. F. McFarren, W. O. Helwig, E. J. Heth, J. C. Anderson, H. J. Reed, and W. Siebenmorgen.

ROCKBESTOS PRODUCTS CORP., New Haven, Conn. Booth 48.—Animated exhibit will show asbestos in the various processing states required to form it into insulation for electrical wires, cables and cords. It will also show dramatic tests, the inherent resistance wire type of insulation to heat, fire, oil, grease and moisture. Attending will be W. E. Tierney, J. O. Pease, J. C. Wise, J. S. Rashba, K. A. Redfield, and E. M. Heery.

TOOL STEEL GEAR & PINION CO., Cincinnati. Booths 74, 75.—Display will include various types of gears in operation. Representing the company will be Leroy Brooks, Jr., E. L. Brooks, E. S. Sawtelle, S. M. Brooks, C. R. Burrell, N. C. Strohmenger, R. Zerfey, L. R. Kerns, H. A. Crowther, J. H. Towle, J. T. Sudduth, H. G. Ross, and G. W. Anderson.

TOWMOTOR CO., Cleveland. Booths 92, 93.—Exhibiting industrial haulage equipment including Towmotor models LT-44 and LT-53. The latter model has been redesigned within the past year. Attending will be L. M. Sears, H. L. Gaddis, C. E. Smith, E. Southworth, W. L. Utley, D. Wessman, E. W. Weaver, H. A. Dimick, and E. R. Wallace.

TRABON ENGINEERING CORP., Cleveland. Booth 78.—This company will exhibit its recently improved design of Trabon hydraulically-operated barrel pumps, and its single pipe nonreversible centralized lubrication system. Both of these products are new. In addition the company will show its reversible single line system. Attending will be E. I. Pfaff, R. L. Harter, F. D. Johnson, E. C. Palmer, J. N. Fauver, L. H. Hein, F. R. Magill, L. W. Deutsch, L. H. Riggs, V. P. Sinnott, and M. E. Mercer.

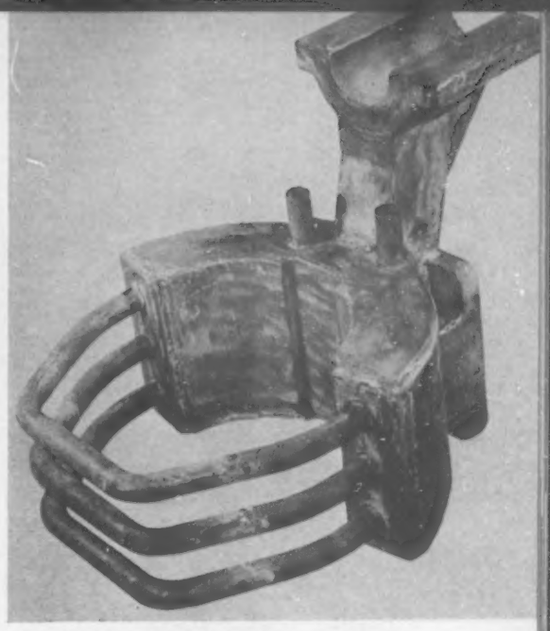
WAGNER ELECTRIC CORP., St. Louis. Booths 62, 63.—Exhibiting hydraulic bridge brakes and electric motors. Attending will be J. S. Smith.

WELLMAN ENGINEERING CO., Cleveland. Booth 42.—In attendance will be A. E. Gibson, Dr. J. C. Hodge, A. J. Lichtinger, C. C. Clayton, W. G. Hildebran, W. C. Swalley, P. H. Douglas, and H. Warriner.

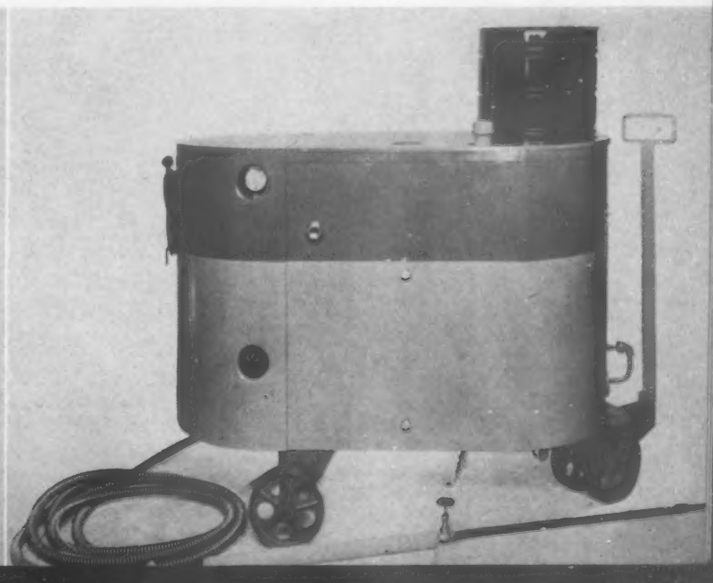
WIEGAND CO., EDWIN L., Pittsburgh. Booth 10.—Will exhibit electric heating devices used in process work in industries and in defense industries in particular. Representatives will be E. E. Bolds, A. A. Anderson, E. N. Calhoun, M. M. Greer, and B. A. Fleming.

YALE & TOWNE MFG. CO., Philadelphia. Booths 86, 87, 88.—Exhibiting a center control fork and ram truck, 12,000 pounds capacity and a small center control electric truck, 2000 pounds capacity. Attending will be S. W. Gibb, M. G. Peck, W. G. Tipton, A. P. Carstensen, E. M. Abramson, F. G. Ricker, A. H. Dobler, and F. A. Dewey.

YORK ICE MACHINERY CORP., York, Pa. Booth 79.—Exhibit will consist of a photographic display featuring the York dry blast systems. Attending will be J. R. Hertzler, H. S. Yoder, James Scott, L. W. Cordrey, J. A. Schurman, W. P. Kohn, E. J. Berlet, and L. E. Kinley.



One of largest copper electrodes used in making electric steel. A. W. Cadman Mfg. Co., Pittsburgh



Left, center control fork and ram truck of 12,000 pounds capacity for use in the steel industry, Yale & Towne Mfg. Co., Philadelphia. Right, Model JL Hypressure Jenny steam cleaner, Homestead Valve Mfg. Co., Coraopolis, Pa.

HIGHLY important to the user of refractories is the kind of research which leads to the improvement of existing types of refractory products, no less than to the development of new ones to meet the ever-increasing severity of the demands that metallurgical progress entails.

Some thirty years ago Harbison-Walker laid the foundation for its central research laboratory at Hays, Pittsburgh, Pennsylvania. The intervening years have witnessed a constant increase in its equipment and in its personnel.

The latest extension recently effected, includes the installation of a complete pilot plant covering the manufacture of brick by any one of the various processes now in use. We know of no other laboratory as modern or as fully equipped for advanced refractories research.

Trade Mark Reg. U. S. Pat. Off.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES

World's Largest Producer Of Refractories

GENERAL OFFICES PITTSBURGH, PENNA.

BUILT BY MORGAN *Engineering*

STRIPPING SLAB INGOTS

● Illustrated is one of two Morgan 200-ton, 64' 0" Span Ingot Strippers at work stripping slab ingots (Max. 32" x 63" x 72"). Efficient and dependable — such huge machines play an important part in stepping up steel production to meet present day demands. Morgan Engineers have designed and developed strippers to perform three distinct stripping operations without making changes in the stripping unit. (1) These machines will strip small-end-up or standard ingots (2) Strip big-end-up hot top ingots (3) Break small-end-up ingots loose from stools. With this arrangement it is possible to strip a mixed heat without any lost time.

★ DESIGNERS • MANUFACTURERS • CONTRACTORS
BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS
★ ELECTRIC TRAVELING CRANES • CHARGING MACHINES
INGOT STRIPPING MACHINES • SOAKING PIT CRANES
★ ELECTRIC WELDED FABRICATION • LADLE CRANES
STEAM HAMMERS • STEAM HYDRAULIC FORGING
★ PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

★ THE MORGAN ENGINEERING CO., Alliance, Ohio
Pittsburgh, 1420 Oliver Building

ATLAS SCALE CARS AND TRANSFERS

assure lowest haulage costs

Atlas Transfers Used in Ore Yard and at Unloading Dock

100 TON—GABLE BOTTOM DUMP TRANSFER CARS

6-Wheel Vanadium steel trucks provided with anti-friction self-aligning bearings

Motor-driven discharge gates operated independently on each side of car

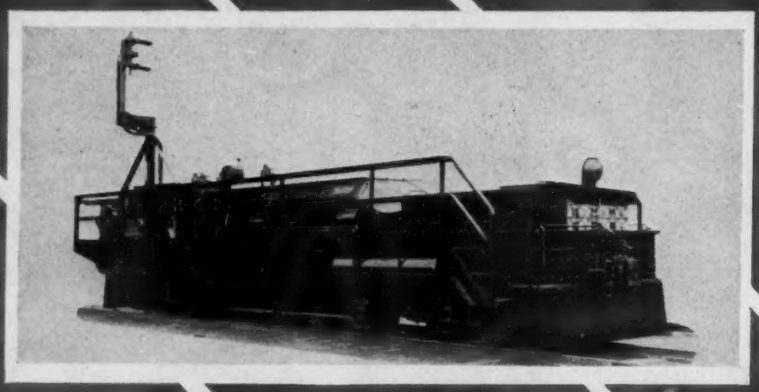
Elevated operators cab for observation of loading and car operation

Discharge gates and bottom of hopper plates provided with electrically operated heaters to prevent freezing of materials in cold weather.

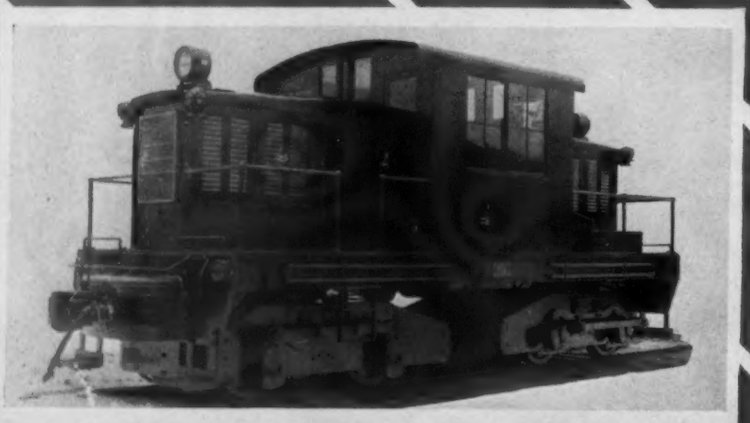
Accurate Weighing of Burdens Recorded on Direct-Reading Tape is Accomplished with Atlas Scale Cars

30 TON—DOUBLE HOPPER BOTTOM DUMP SCALE CARS

Atlas all-steel roller suspension type provided with Atlas Indicating Dial and Type Recording Apparatus permitting direct reading of separate burden weights. Provides Automatic Registration of weight of load in car or skip pit without repeating.



50 TON
DIESEL-ELECTRIC LOCOMOTIVE
FOR INTER-PLANT HAULAGE



Atlas Cars for Every Kind of Inter-Plant Haulage

ATLAS PRODUCTS

Electric Locomotives and Cars, Storage Battery Locomotives, Transfer Cars, Scale Charging Cars, Specially Designed Cars for All Purposes, Diesel Electric and Gas-Electric Locomotives, Storage Battery Trucks and Tractors, By-Product Coke and Gas Plant Equipment.

THE ATLAS CAR & MFG. CO.

Engineers *Manufacturers*

CLEVELAND, OHIO

Steel enough for 7 New Dreadnoughts *Saved by* RODINE

Seven new, fast, 45,000-ton battleships would make a walloping difference in *any* navy.

Last year, the steel saved by *Rodine* in the world's pickling baths would have been enough for seven of these super floating fortresses. Significant figures, when you consider that the U. S. fleet has seventeen battleships today!

Steel-making capacity can be expanded... but the *immediate* step toward increased production is *conservation*. Not only does *Rodine*—amazingly efficient Selective Control Chemical—*save* the steel which might have been lost by acid attack in pickling baths; it lowers consumption of acid, saves labor used in charging vats, reduces acid brittleness, blistering, corrosion, eliminates formation and escape of fumes.

If you are not now using *Rodine* in your pickling room, learn how it will help you raise production and lower costs. For more than 20 years, the world over, American Chemical Paint Company has specialized in the development of chemicals for *saving* and *protecting* steel. Adequate stocks are on hand. Bulletin No. 13 is available with more detailed information.

RODINE *Saves* STEEL

AMERICAN CHEMICAL PAINT CO.

MAIN OFFICE AND WORKS
AMBLER • • • PENNA.

CHEMICALS ACP PROCESSES

DETROIT, MICH., 6339 Palmer Ave., E.
CANADIAN BRANCH
WALKERVILLE • • • ONT.

BROSIUS EQUIPMENT

Speeds-up

• PRODUCTION •

Above: This is our 6000 lb. capacity, Auto Floor Manipulator, used in handling billets under the steam hammer and press after charging and drawing the heating furnace.

Below: The 15,000 lb. capacity Auto Floor Tongs Charger, charges and draws from heating furnaces.

Above: A Standard 2000 lb. capacity Auto Floor Tongs Charger, used in serving heating furnace and mill—charging and drawing slabs.

Below: The Standard 4000 lb. capacity Auto Floor Box Charger, serves two thirty-five ton open hearth furnaces and handles five foot charging boxes, completing cycle in 45 seconds.

ON this page we show various types and capacities of Brosius Auto Floor Machines, arranged to handle charging boxes for charging melting furnaces; equipped with tongs for serving heating furnaces, mills, hammers, presses, etc.; and designed as manipulators for manipulating pieces under hammers, and presses, as well as charging and drawing the heating furnaces.

Brosius Auto Floor Chargers and Manipulators are self contained. They require no tracks or expensive runways and their movement is not restricted to any definite path. No provision, aside from a good floor on which to operate, is necessary for their installation.

The charging machines are driven by an electric motor, while the rotation and tilting of the peel or operation of the tongs are accomplished through oil cylinders operated by a motor driven oil pump mounted on the machine.

The Manipulators have six different motions and, with the exception of the travel motion, all are hydraulically actuated. The front and rear of the peel are raised and lowered by independent cylinders, so that the peel can at all times be kept level with the anvil dies.

All machines, both chargers and manipulators, are rubber tired, provided with anti-friction bearings and are hydraulically steered, eliminating all fatiguing effort on the part of the operator.

Electric power is received through a flexible cable and a rotating collector mounted on the mast of the machine, or gasoline motor generator set can be furnished.

With these machines, extreme mobility is obtained as the tractor unit turns 180°, permitting the machine to turn on its own wheel base—a feature of great importance where operating space is limited.

Built in capacities of from 2000 lb. to 20,000 lb., we can offer a machine to meet most any charging or manipulating problem.

More than 100 Brosius Auto Floor Charging Machines and Manipulators are in operation in the United States and Abroad.

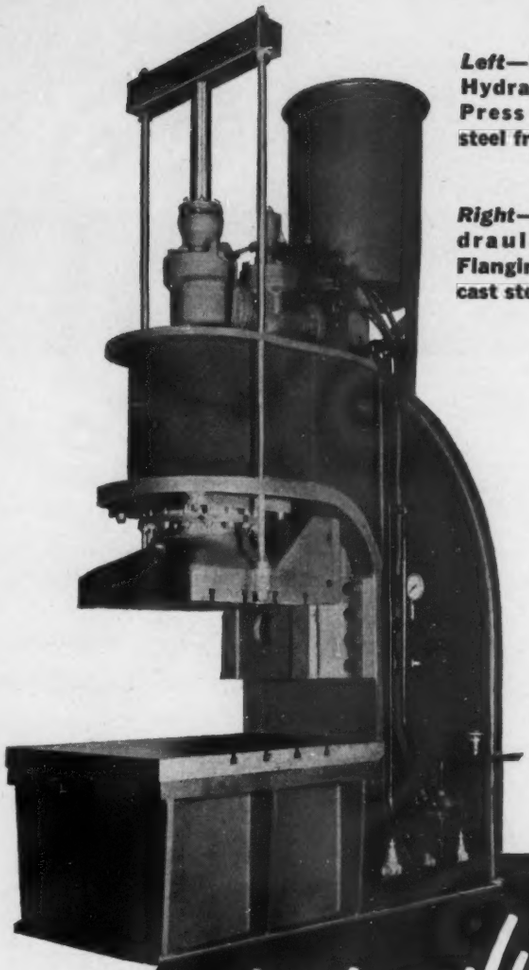
Send us your problems. We will be glad to work with you in solving them.

Edgar E. BROSIUS *Inc.*

MANUFACTURERS & DESIGNERS OF SPECIAL EQUIPMENT FOR BLAST FURNACES AND STEEL MILLS

PITTSBURGH SHARPSBURG BRANCH, **PA.**

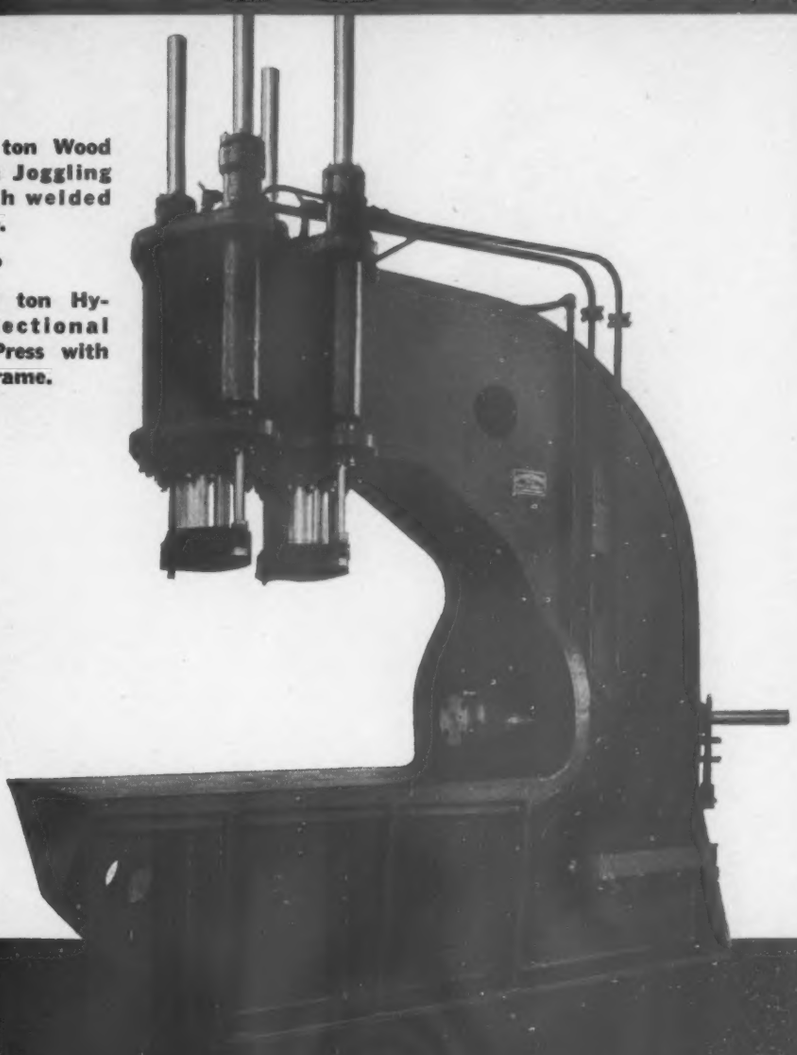
Brosius Equipment is covered by patents allowed and pending in the United States and Foreign Countries.



Left—350 ton Wood Hydraulic Joggling Press with welded steel frame.

•

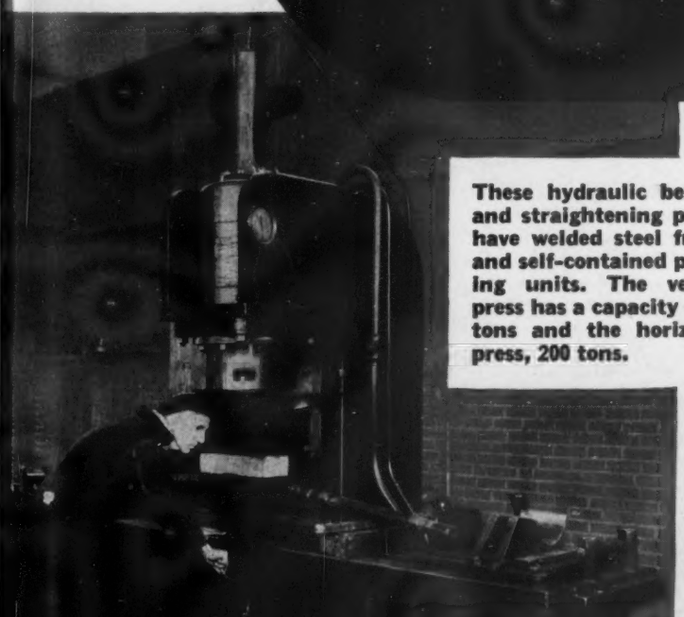
Right—200 ton Hydraulic Sectional Flanging Press with cast steel frame.



Hydraulic Presses...

The demand for ships and more ships calls for more and better hydraulic presses. WOOD Presses are contributing their full share in the rapidly expanding shipbuilding program.

For hydraulic press requirements in the shipbuilding or any other industry, consult the R. D. Wood engineering department.



These hydraulic bending and straightening presses have welded steel frames and self-contained pumping units. The vertical press has a capacity of 100 tons and the horizontal press, 200 tons.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE

ESTABLISHED 1803

R.D. Wood Co.

PHILADELPHIA, PA.

A.I.S.E. Program

■ Interest will not be lacking at any one of the nine morning and afternoon sessions based upon the scope of the papers to be presented. Subjects will be discussed under such divisions as electrical, mechanical, welding, combustion engineering and operating practice and lubrication.

All of the events of the convention and exposition, with the exception of the social functions, will be held in the auditorium. The inspection trip to the Otis Steel Co. will depart from the auditorium. Social affairs will be held at the Statler hotel, which will be the official convention headquarters of the A. I. S. E.

Tuesday, Sept. 23

9:00 A.M.

Registration

Chairman: T. B. McElray, Supt., Light and Power, Carnegie-Illinois Steel Corp., Youngstown, O.

Vice Chairman: E. C. McDonald, Comb. Engr., Republic Steel Corp., Cleveland.

9:15 A.M.

Business Session

Chairman: W. A. Perry, Supt., Electric and Power Dept., Inland Steel Co., East Chicago, Ind.

Vice Chairman: J. L. Miller, Asst. Chief Comb. Engr., Republic Steel Corp., Cleveland.

9:30 A.M.

Electrical Engineering Division

Chairman: K. E. Dinius, Electrical Engr., Carnegie-Illinois Steel Corp., Chicago.

Vice Chairman: H. R. Ford, Electrical Engr., Wheeling Steel Corp., Steubenville, O.

"Report of Crane Specification Committee", by F. W. Cramer, Electrical Engr., Carnegie-Illinois Steel Corp., Pittsburgh.

"Ore Bridges" by George Wolfe, Special Engr., Dravo Corp., Pittsburgh.

"Transmitting Torque from Electric Motors", by A. M. MacCutcheon, Vice Pres. in Charge of Engrg., Reliance Electric & Engineering Co., Cleveland.

1:30 P.M.

Mechanical Engineering Division

Chairman: J. D. Jones, Ch. Engr., Youngstown Sheet & Tube Co., Youngstown, O.

Vice Chairman: J. E. Graf, Asst. Ch. Engr., Jones & Laughlin Steel Corp., Pittsburgh.

"Development of New Rolling and Steel Capacity at Steel Co. of Canada", by C. H. Hunt, Consulting Engineer, Pittsburgh.

"Design and Operation of the Bessemer Converter", by D. R. Loughrey, Asst. Gen. Supt., Jones & Laughlin Steel Corp., Pittsburgh.

"Rolling Pressures in the Strip Mill", by M. R. Stone and J. I. Greenberger, United Engineering & Foundry Co., Pittsburgh.

1:30 P.M.

Welding Engineering Division

Chairman: A. W. Steed, Maintenance Supt., American Rolling Mill Co., Middletown, O.

Vice Chairman: L. W. Long, Supt. of Maintenance, National Tube Co., Lorain, O.

"Advanced Methods of Welding", by E. W. P. Smith, Consulting Engr., Lincoln Electric Co., Cleveland.

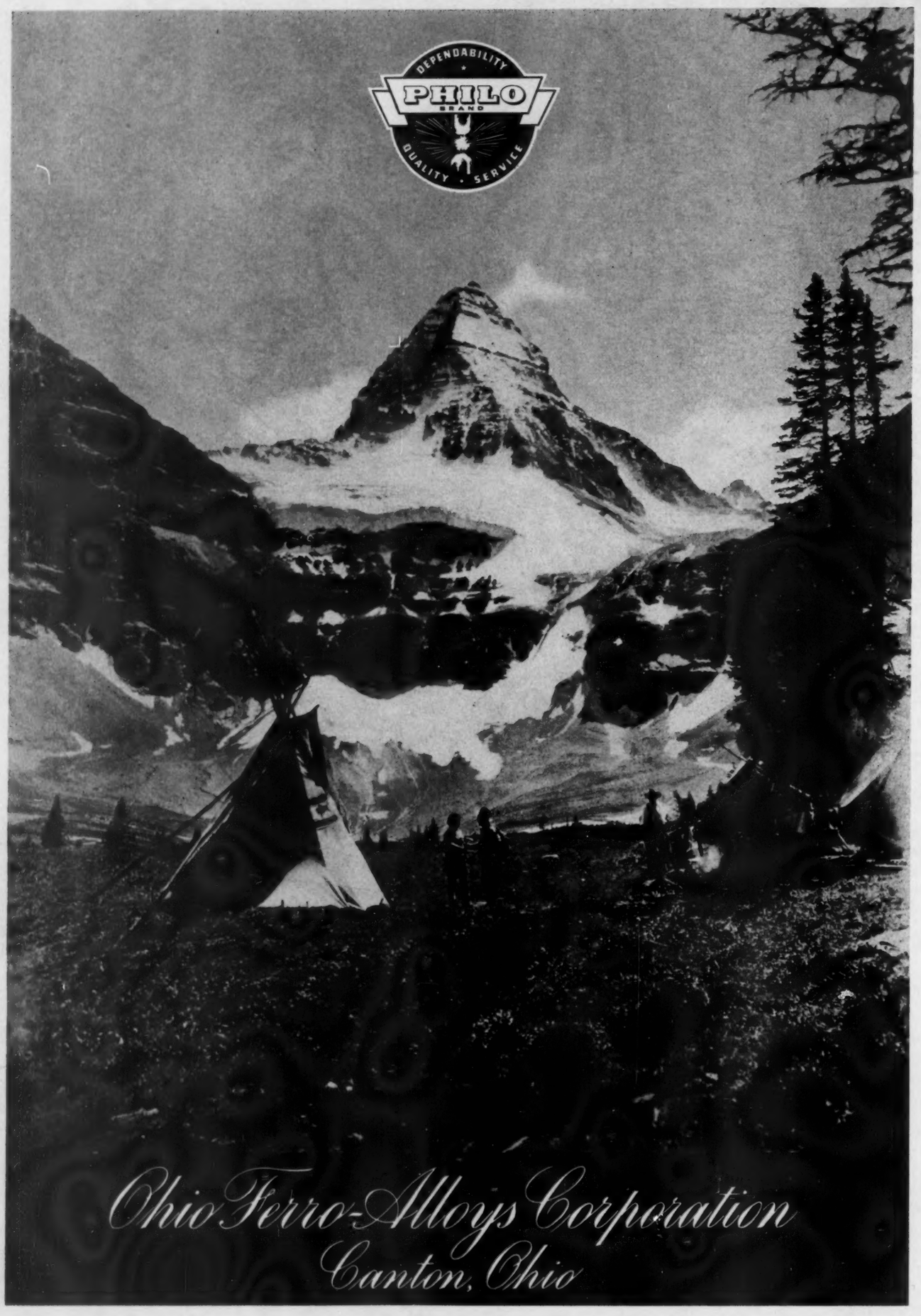
"Classification of Modern Welding Equipment", by C. H. Jennings, Res. Dept., Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Welding in Cold Strip Processing", by J. H. Cooper, Welding Engr., Taylor Winfield Co., Warren, O.

With nothing short of modern entering into this new steel plant, the ladle handling job quite naturally went to ALLIANCE . . . a 50-ton ladle crane with a 15-ton auxiliary hoist, span of 75′0″.

In addition to Ladle Cranes, ALLIANCE designs and builds Ingot Strippers, Soaking Pit Cranes, Standard Cranes, Gantry Cranes, Ore and Coal Bridges, Open Hearth Charging Machines, Slab and Billet Charging and Drawing Machines, Car Dumpers, Forging Manipulators, Board and Steam Drop Hammers, Coal Pier Equipment, Rolling Mill Machinery and Special Machinery to your individual requirements.

THE ALLIANCE MACHINE COMPANY
ALLIANCE OHIO


DEPENDABILITY
PHILO
BRAND
QUALITY • SERVICE
Ohio Ferro-Alloys Corporation
Canton, Ohio

Wednesday, Sept. 24

9:00 A.M.

Combustion Engineering Division

Chairman: A. J. Fisher, Fuel Engr., Bethlehem Steel Co., Sparrows Point, Md.

Vice Chairman: P. C. Singleton, Asst. Steam Engr., Inland Steel Co., East Chicago, Ind.

"Recent Advances in Control of Multi-Fuel Fired Furnaces", by J. C. Vaaler, Vice Pres., Askania Regulator Co., Chicago.

"Modern Designs of Annealing Covers", by Lee Wilson, President, Lee Wilson Engineering Co., Cleveland.

"Submerged Heating for Pickling Baths", by W. G. See, The Submerged Combustion Co. of America, Inc., Hammond, Ind.

9:00 A.M.

Operating Practice Division

Chairman: C. P. Betz, Asst. Manager, Hanna Furnace, Great Lakes Steel Corp., Ecorse, Mich.

Vice Chairman: P. V. Martin, Asst. Div. Supt., Coke Plant and Blast Furnace, Carnegie-Illinois Steel Corp., Gary, Ind.

"Effect of Rate of Operation in the Coke Plant", by B. J. C. Van der Hovan, Gen. Supt., Koppers Co., Pittsburgh.

"Modern Sintering Plant Design and Construction", by M. F. Morgan, Engr., Republic Steel Corp., Cleveland.

"Relation of Raw Materials to the Manufacturing Processes", by Charles Hart, President, Delaware River Steel Co., Chester, Pa.

1:30 P.M.

Inspection Trip

Otis Steel Co., Cleveland. Buses will leave Cleveland Public Auditorium.

Thursday, Sept. 25

9:00 A.M.

Electrical Engineering Division

Chairman: J. S. Murray, Ch. Elec. Engr., Follansbee Steel Corp., Follansbee, W. Va.

Vice Chairman: J. I. Kaspari, Elec. Engr., Weirton Steel Co., Weirton, W. Va.

"Report on Field Tests on IR Drop Compensation", by G. E. Stoltz, Mgr., Metal Working Engr., Industrial Engrg. Dept., Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Temper Mill Drives and Control", by T. B. Montgomery, Control Engr., Allis-Chalmers Mfg. Co., Milwaukee.

"Motor Applications and Power Requirements for Strip Processing Lines", by H. W. Poole, Steel Mill Section, Industrial Engrg. Dept., General Electric Co., Schenectady, N. Y.

9:00 A.M.

Combustion Engineering Division

Chairman: L. N. McDonald, Jr., Chief Power and Fuel Engr., Carnegie-Illinois Steel Corp., Youngstown, O.

Vice Chairman: E. C. McDonald, Comb. Engr., Republic Steel Corp., Cleveland.

"Modernization of Heating Furnace Design", by M. H. Mawhinney, Consulting Engineer, Salem, O.

"Fuel Applications in Metallurgical Furnaces", by F. S. Bloom, President, Bloom Engineering Co., Pittsburgh.

"Organization of Fuel Department Personnel and Practice", by T. J. McLaughlin, Asst. to Vice Pres. of Operations, Carnegie-Illinois Steel Corp., Pittsburgh.

1:30 P.M.

Operating Practice Division

Chairman: F. E. Flynn, District Mgr., Republic Steel Corp., Warren, O.

Vice Chairman: F. K. Schefe, Ch. Engr., Sheet and Tin Mills, Carnegie-Illinois Steel Corp., Gary, Ind.

"Procedure in Scarfing High Carbon and Alloy Steels", by G. D. Winlack, Steel Mill Engr., Air Reduction Sales Co., New York.

"Electrolytic Tinplate", by M. R. Stone, United Engineering & Foundry Co., Pittsburgh.

"Oxy-Acetylene Defense Developments", by J. H. Zimmerman, Development Mgr., The Linde Air Products Co., New York.

1:30 P.M.

Lubrication Engineering Division

Chairman: T. R. Moxley, Gen. Master Mechanic, Wheeling Steel Corp., Steubenville, O.

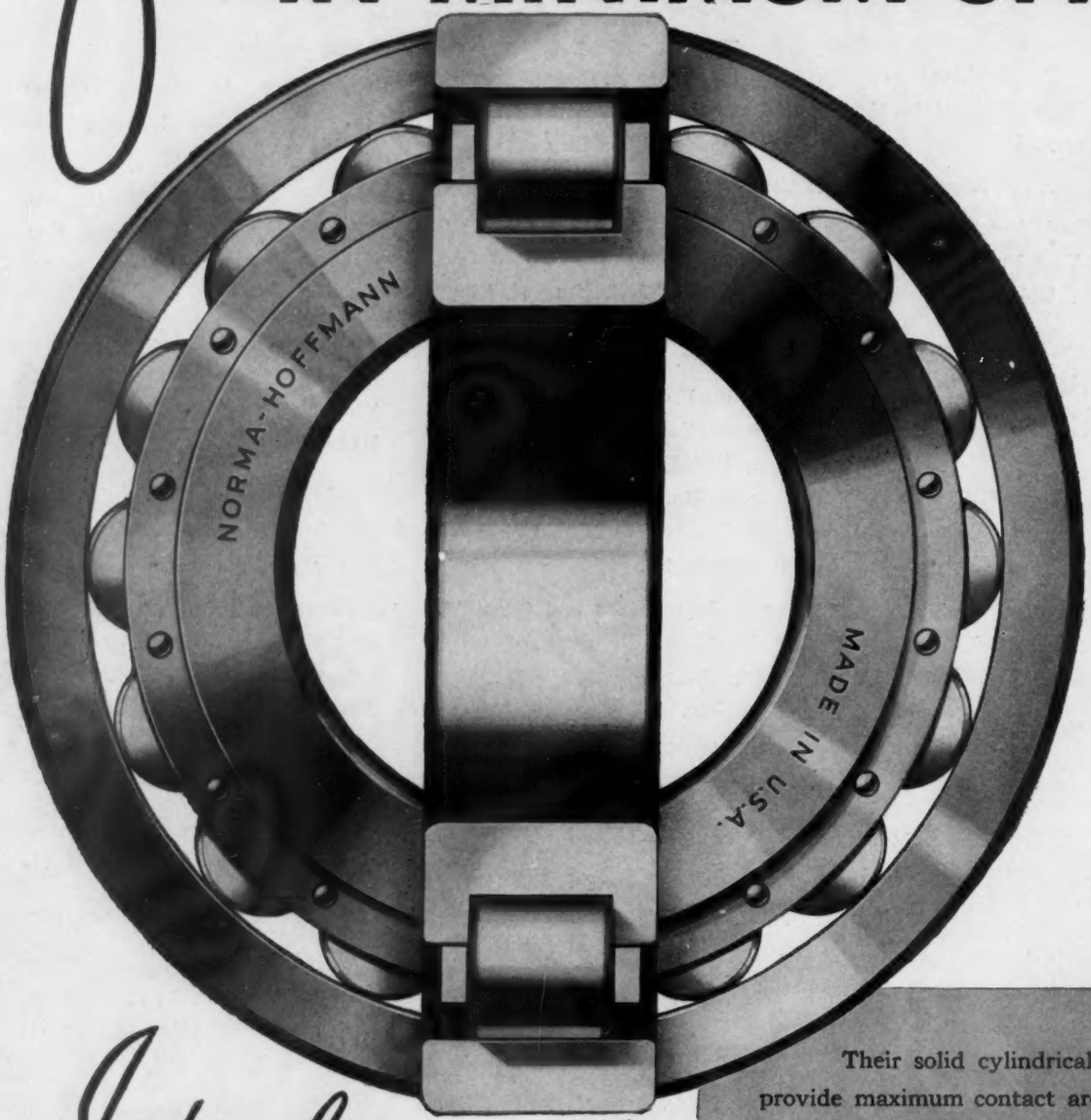
Vice Chairman: C. R. Hand, Lubrication Engr., Bethlehem Steel Co., Sparrows Point, Md.

"Diesel Engine Lubrication", by D. N. Evans, Lubrication Engr., Inland Steel Co., East Chicago, Ind.

"Sealing Methods for Oil Film Bearings", Symposium led by L. F. Coffin, Supt., Mechanical Dept., Bethlehem Steel Co., Sparrows Point, Md.

"Filtration and Reclamation of Oils", by C. A. Bailey, Asst. to Supt., Plant Maintenance, Sheet and Tin Mill Div., Carnegie-Illinois Steel Corp., Gary, Ind.

for MAXIMUM CAPACITY IN MINIMUM SPACE



Interchangeable

WITH SINGLE-ROW BALL BEARINGS

NORMA-HOFFMANN

PRECISION ROLLER BEARINGS

NORMA-HOFFMANN BEARINGS CORP'N.,

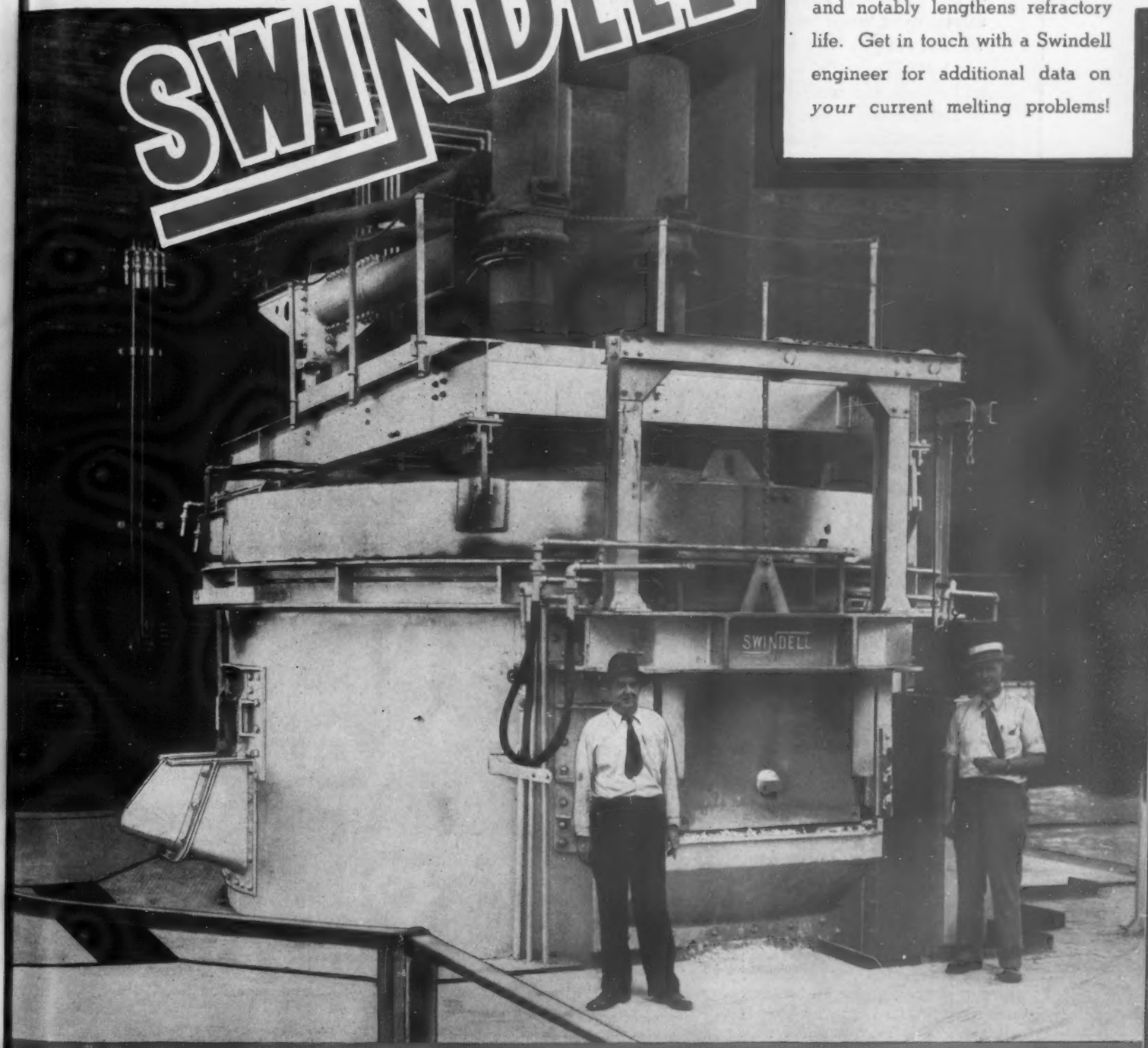
STAMFORD, CONN., U. S. A. • *Founded in 1911.*

Write for the Catalog. Let our engineers work with you.

Their solid cylindrical rollers provide maximum contact area, giving larger load and shock-absorbing capacity than any other single-row bearing of like dimensions. Thus, when NORMA-HOFFMANN PRECISION ROLLER BEARINGS are used in place of ball bearings, a greater factor of safety is provided, together with added life, particularly under vibration and overload. PRECISION qualities in workmanship and materials adapt them alike for both low and high speeds.

Another DEFENSE UNIT by SWINDELL

Typically SWINDELL in its capacity to deliver heavy continuous production, this unit is the latest in a number serving the Allegheny Ludlum Steel Corporation. Featuring a Top Charge, Four-Point Suspension Swinging Roof, this 16-foot furnace saves *production time* (charging period is reduced 30 to 60 minutes), *power*, *labor*, and notably lengthens refractory life. Get in touch with a Swindell engineer for additional data on *your* current melting problems!



SWINDELL-DRESSLER Corporation

DESIGNERS AND BUILDERS OF MODERN FURNACE EQUIPMENT SINCE 1850

PITTSBURGH, PA.

If You Have Trouble Getting Certain Alloys . . . Call on Us for Suggestions

IF YOU are having difficulty because you can't get certain ferro-alloys in the quantity you need or as quickly as you want them, we may be able to be of help. Perhaps we can suggest how you can substitute alloys that are more readily available for those you are now using and still obtain the same final result. Or it may be possible to replace one grade of a ferro-alloy with another and still maintain the quality of your product. We may be able to indicate how you can change your practice to substitute one alloy for another, or one grade for another, with minimum disturbance to you and with maximum satisfaction to your customers.

This service is based on over 35 year's experience in the production and use of ferro-alloys. It is supplied by a staff of competent metallurgists who can give you practical, on-the-job help. Ask for this service whenever you need it, without obligation.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

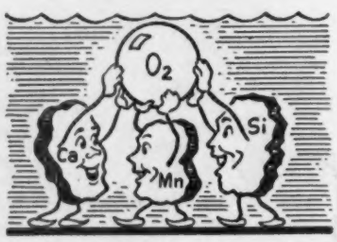
30 East 42nd Street UCC New York, N. Y.

Items of Interest about "Electromet" Ferro-Alloys

•

Silico-Manganese Simplifies Production of Low-Carbon Manganese Steel – Silico-manganese is a quick and effective deoxidizer for both acid and basic open-hearth steel. The low carbon content of this alloy, coupled with its rapid cleansing action, simplifies the making of low-carbon manganese steel and facilitates close control of final carbon content.

Calcium-Manganese-Silicon Is A Good Deoxidizer for Wrought Steels – Calcium-manganese-silicon is a powerful cleansing agent for wrought steels because it includes three strong deoxidizers in a combination which is more effective than separate alloys containing these elements. It leaves the steel extremely clean and free from harmful, segregated inclusions. Also, calcium-manganese-silicon does not mask the effect of grain-refining agents, and

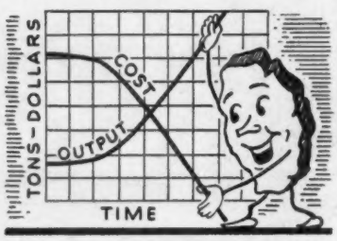


hence can be used in conjunction with them for producing clean, fine-grained steels.

Vanadium Has Wide Application – Ferrovanadium is used for making fine-grained steels having high dynamic strength, fatigue resistance, and wear-resistance. Such steels include high-speed tool steels, nitriding steels, and many engineering and structural steels.

Zirconium Is Effective for Reducing Age-Hardening of Deep-Drawing Steels – The use of zirconium in deep-drawing steels decreases age-hardening and thus minimizes cracking even in the most severe draws. Zirconium ties up the nitrogen which is to a large degree responsible for age-hardening, and renders it harmless.

Medium-Carbon Ferromanganese Increases Furnace Output – In the production of low-carbon steel, medium-carbon ferromanganese introduces less carbon to the bath than standard ferromanganese. Consequently, oxidation of the bath need not be as severe, furnace time is materially shortened, and furnace output is increased.



• • •

If you want more information about these and the many other "Electromet" ferro-alloys and metals and the service that goes with their purchase, write for the booklet, "Electromet Products and Service."

Electromet
Trade-Mark
Ferro-Alloys & Metals

Available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

The word "Electromet" is a registered trade-mark of Electro Metallurgical Company.

Exhibitors

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TUESDAY
9:00 A.M. to 10:00 P.M.

WEDNESDAY
9:00 A.M. to 10:00 P.M.

THURSDAY
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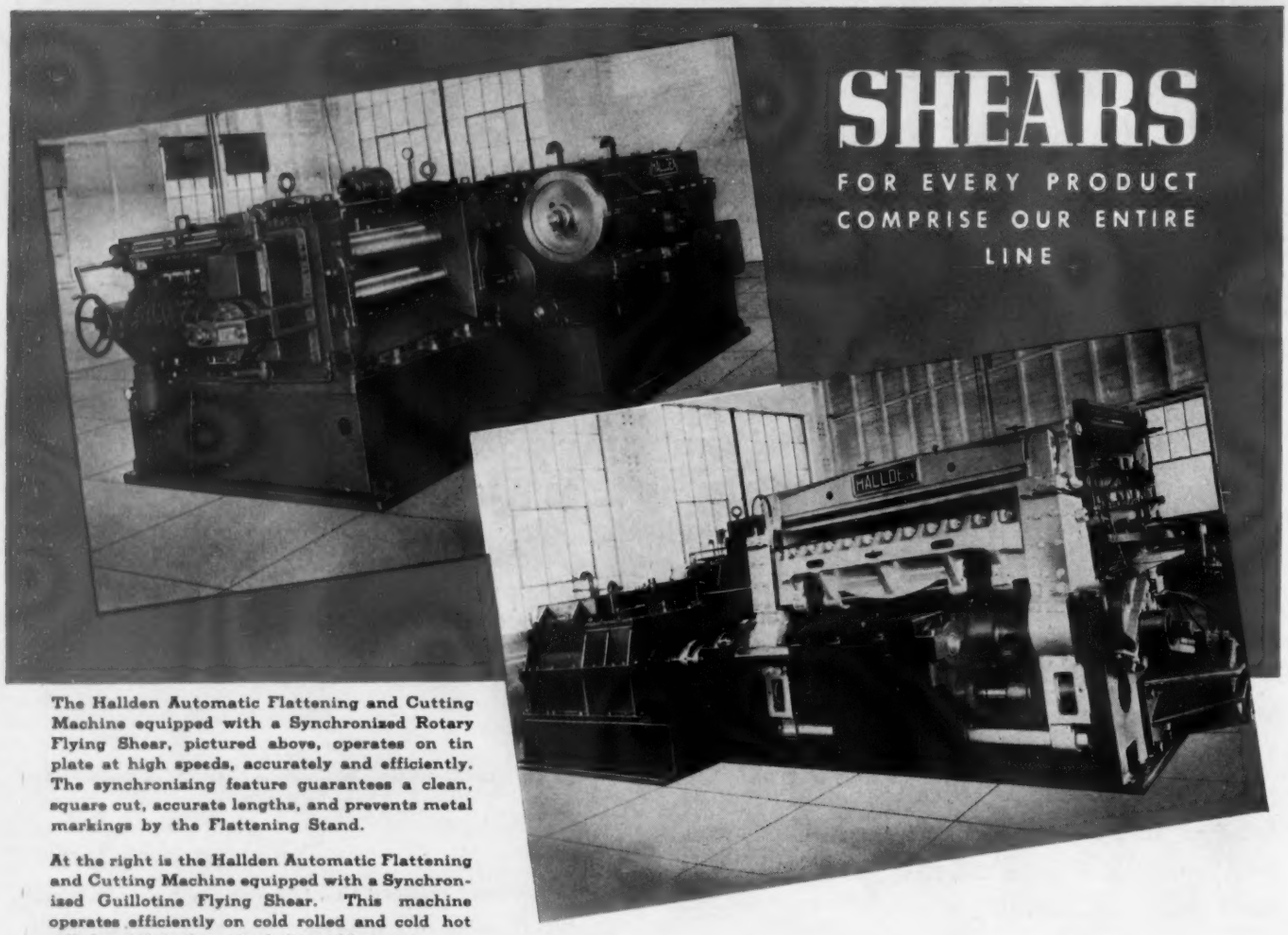

SHEARS

FOR EVERY PRODUCT COMPRISE OUR ENTIRE LINE

The Hallden Automatic Flattening and Cutting Machine equipped with a Synchronized Rotary Flying Shear, pictured above, operates on tin plate at high speeds, accurately and efficiently. The synchronizing feature guarantees a clean, square cut, accurate lengths, and prevents metal markings by the Flattening Stand.

At the right is the Hallden Automatic Flattening and Cutting Machine equipped with a Synchronized Guillotine Flying Shear. This machine operates efficiently on cold rolled and cold hot rolled metal, both on the light and heavy gauges.

Specializing in one product exclusively has established Hallden as a leader in the manufacture of Flying Shears. Automatic levellers and shears for steel and nonferrous metals, shears for round, square or hexagon wire and shears for special applications are among the Hallden products. Consult us about your shear problems.

THE HALLDEN MACHINE CO.

THOMASTON, CONN.

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• W. H. A. ROBERTSON & COMPANY, LTD – BEDFORD, ENGLAND

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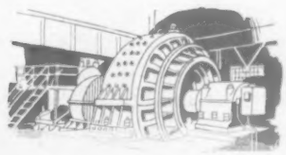
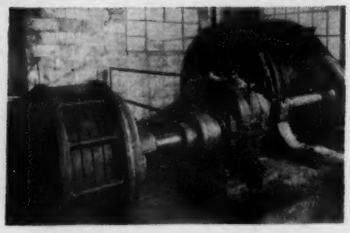


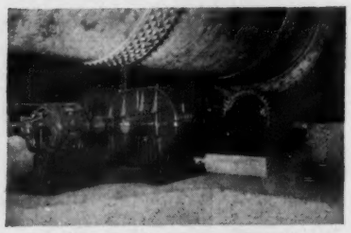
Jones HERRINGBONE SPEED REDUCERS

● This view of a Jones Triple Reduction Herringbone Speed Reducer typifies a line that is noted for advanced design, superior materials and precision workmanship.

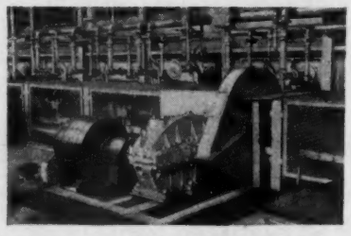
● Catalog No. 70 of Jones Herringbone Reducers presents a vast amount of data relating to Herringbone Reduction Units. Illustrations show a broad range of herringbone reducer applications and technical information shows how to select reducers for all conditions of service in accordance with the A.G.M.A. recommended practice.



● Single type Jones Herringbone Speed Reducer driving hoist in coal mine.



● Double type Jones Herringbone Speed Reducer driving kiln in cement plant.



● Shown above is a triple type Jones Herringbone Speed Reducer driving normalizing furnace in steel plant.

JONES Herringbone Gear Speed Reducers are built in a wide range of ratios and ratings to cover every requirement. Single (Type SH) reducers in standard ratios range from 1.25 to 1 up to 11 to 1 in ratings from 1.3 to 440 H.P. Double (Type DH) reducers are built in standard ratios from 10.9 to 1 up to 72 to 1 in ratings from 0.5 to 275 H.P. The triple reduction reducers (Type TH) cover a range of ratios from 86.9 to 1 up to 355.8 to 1 in ratings from 0.3 to 78 H.P.

All these reducers have heat treated gears, ground shafts and are mounted with anti-friction bearings throughout. Cast Iron bases are available for all variations of motor assembly. Liberal stocks are carried to facilitate shipments.

W. A. JONES FOUNDRY & MACHINE CO.

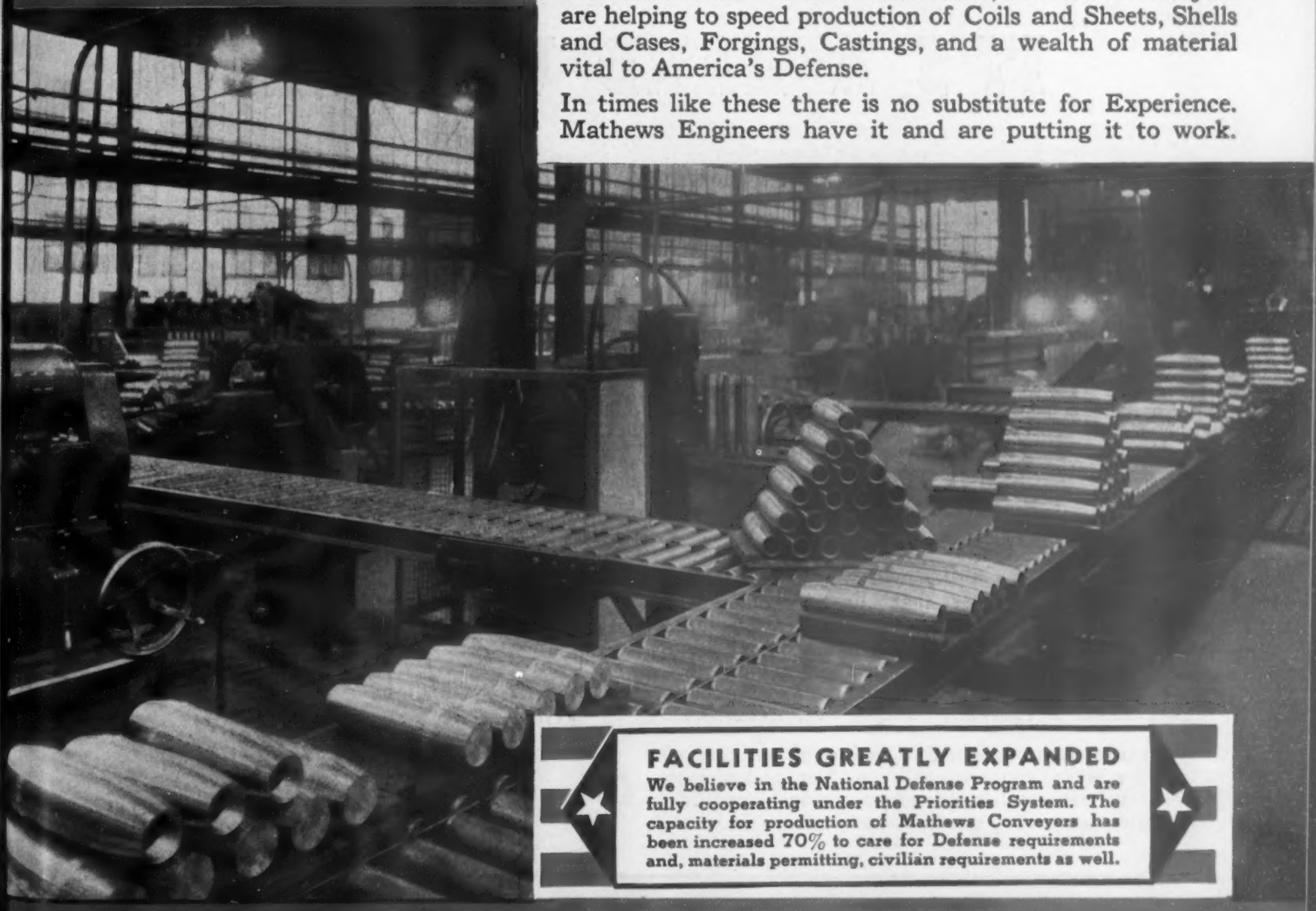
4437 Roosevelt Road, Chicago, Illinois

MATHEWS CONVEYERS

Keeping Defense Materials *Moving!*

● In the Industrial Plants of America, Mathews Conveyers are helping to speed production of Coils and Sheets, Shells and Cases, Forgings, Castings, and a wealth of material vital to America's Defense.

In times like these there is no substitute for Experience. Mathews Engineers have it and are putting it to work.

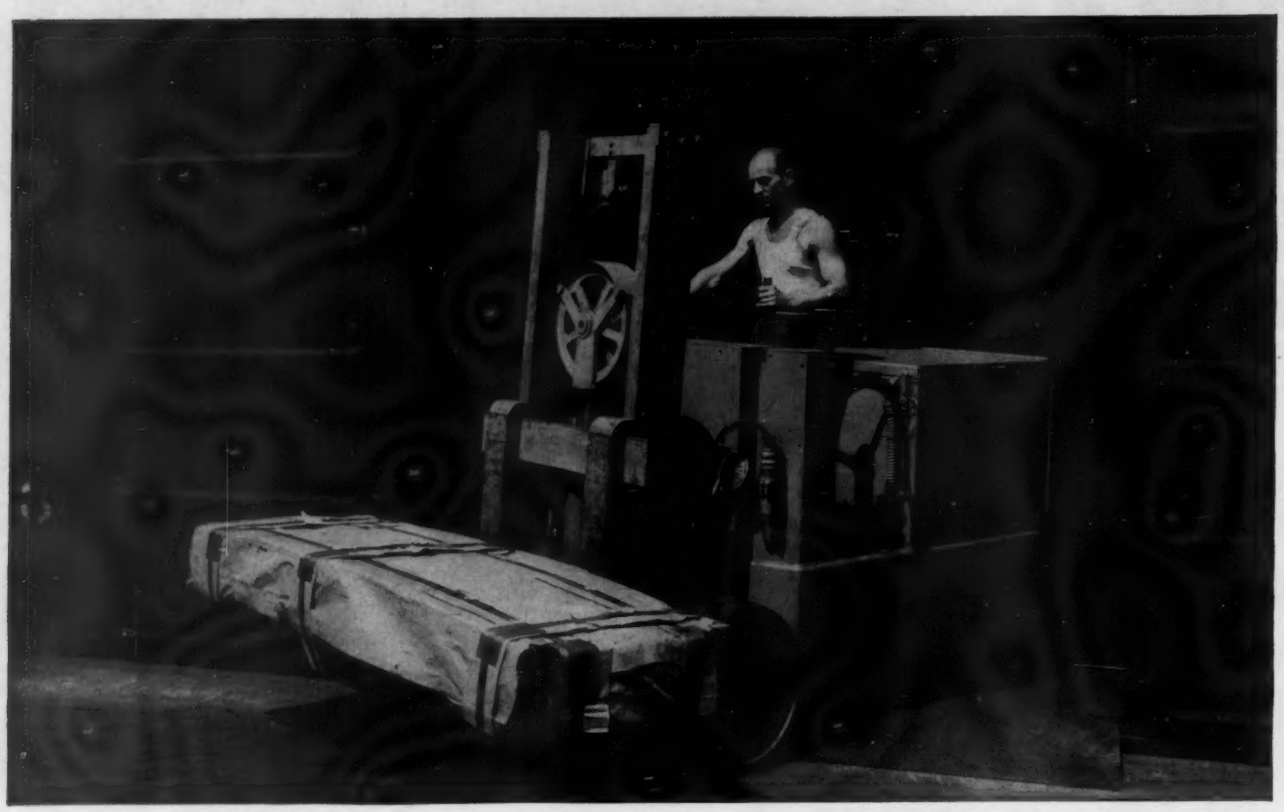


FACILITIES GREATLY EXPANDED

We believe in the National Defense Program and are fully cooperating under the Priorities System. The capacity for production of Mathews Conveyers has been increased 70% to care for Defense requirements and, materials permitting, civilian requirements as well.

MATHEWS CONVEYER COMPANY, ELLWOOD CITY, PENNA.

FIELD ENGINEERS AND SALES OFFICES LOCATED IN 30 INDUSTRIAL CENTERS



IT'S A HARD WORKER!

A battery industrial truck works anywhere from 8 to 24 hours a day and from 250 to 300 days a year.

Judged by almost any standard, it makes a remarkable record of day-in-and-day-out dependability, freedom from trouble, long life and economy.

It will put in about six times more service hours per year than the average automobile, yet be in the shop less. It even outdoes a steam railroad locomotive in availability for service.

For example, in 24-hour-a-day service, the storage batteries work in relays, one being charged and flushed while the other is powering the truck. Except for two or three minutes needed to exchange batteries (at intervals of 8 to 12 hours) the truck does not need to stop work for servicing of its power unit.

This helps explain why ***battery*** industrial trucks are first choice in industries that must have continuous operation 24 hours a day, day after day, year after year. They are first choice, too, in industries that know, and watch, operating costs. They use low-cost electric power, and their entire operating mechanism is inherently simple and trouble-free.

They are extra dependable and extra economical when powered by Edison Alkaline Storage Batteries. With ***all-steel*** cell construction, a solution that is a natural preservative of ***steel,*** and plates in which all active materials are retained by perforated ***steel*** tubes and pockets, they are the most durable, lightest, most trouble-free of all storage batteries.

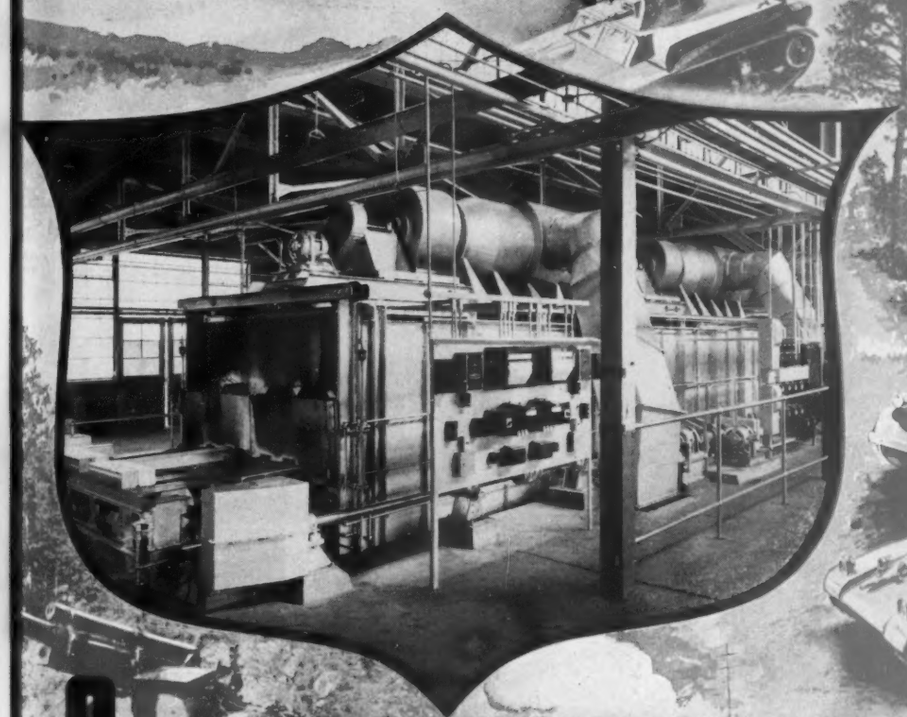
Alkaline batteries provide ample power for the largest trucks yet built, for trucks operating within limited clearances, and for any daily schedule up to 24 hours.

For more detailed information send for our bulletin MODERN MATERIAL HANDLING. New edition, just off the press, describes the various industrial-truck handling systems; illustrates the latest methods; gives detailed data on alkaline batteries. Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, New Jersey, U. S. A.

Edison
STEEL *Alkaline*
BATTERIES

YOUR HEATING PROBLEMS

RECEIVE A PRACTICAL SOLUTION WITH SALEM



A MODERN CONVECTION TYPE FURNACE FOR HEATING COPPER OR ALUMINUM BILLETS FOR EXTRUSION

SALEM ENGINEERING CO. - SALEM, OHIO

SALEM ENGINEERING COMPANY

WHERE TO, SOLDIER?

THEY gave him a pass today, for the week-end.

The world is his—at least as far as the nearest town. No more K.P., no more drill, no more formations till Monday. He can be John American, his own master, having a good time. That pass is his *open sesame.*

But is it?

Where will he and his buddies go in that town overrun with soldiers? Where will they eat and sleep? What can the community do to give them relaxation and entertainment?

• • •

One of the forgotten problems in any high-speed scheme of national defense is how to provide for the soldier and sailor off duty.

Within the camps and naval stations the services themselves have excellent facilities. But in the surrounding cities and towns the problem is acute and difficult.

Many of the newer army camps are located far from the larger centers. Into towns of 1,000 to 5,000 population may come as many as 3,000 men on a single evening. Where are they to go? How is the community to provide for them, to see that they get the wholesome food and entertainment that all of us would like them to have?

To meet this emergency all the "service agencies" of the last war have joined forces. The Y. M. C. A., the National Catholic Community Service, the Salvation Army, the Y. W. C. A., the Jewish Welfare Board and the National Travelers Aid Association have combined to form the United Service Organizations—known as the U. S. O. Differences of race and creed have been forgotten; lesser distinctions have been subordinated to the idea of united service.

How can you help? The U. S. O. is raising approximately eleven million dollars to finance its program of leisure-time aid to the men in service. This is your opportunity to do your bit for national defense. Give generously to the U. S. O.

How will the money be used? In maintaining 360 U. S. O. clubs. The government is building the club houses themselves. What is required now is money to operate them.

How and where shall you give? To the local committee that has charge of your city's part in this national drive. No matter how much or how little you feel you can give, send it today to your local chairman or to National U. S. O. Headquarters, Empire State Building, New York.

LAWRENCE
Copper and Bronze Castings
OF HIGHEST QUALITY

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STANDARD TUYERES

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CINDER NOTCHES

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VALVES AND SEATS

●

Copper Electrode Holders and Bronze Electrode Holders and Wedges Finished Complete.

Lawrence Heavy Duty Closed Bottom Tuyere Cocks.

Lawrence Heavy Duty Furnace Unions, Ball Unions.

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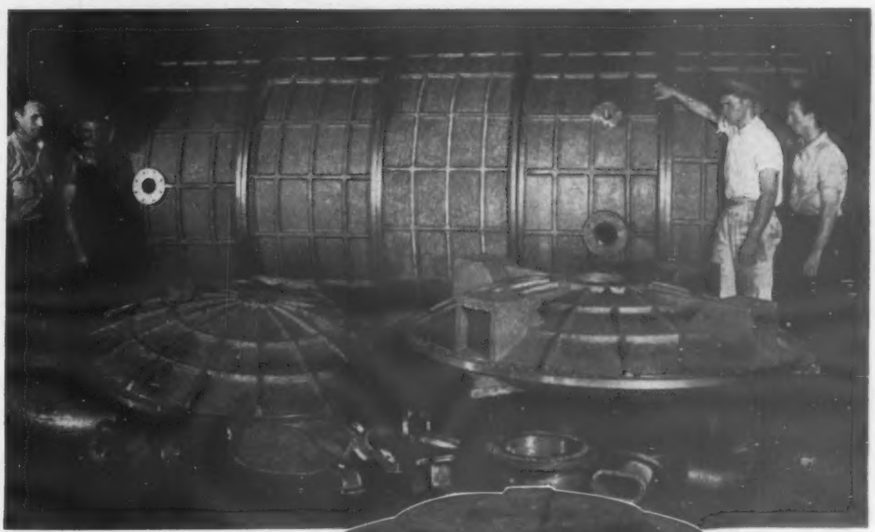
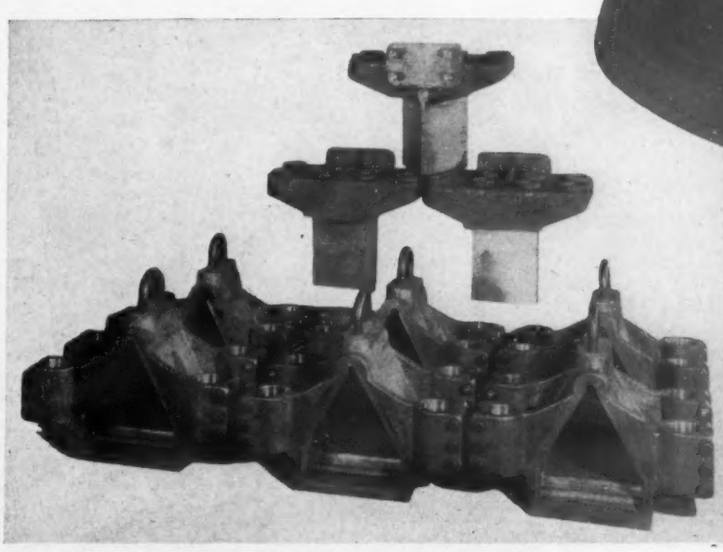


Part of Bronze Castings for a 6 foot Converter Tank with flanges faced and drilled ready for erection. Total weight 28,000 lbs.

2000 lb. Alloy Bronze Bell for use in the Navy Department.

Set of Copper Electrode Castings. Weight 1000 to 1200 lbs. each.



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COPPER & BRONZE
Bessemer Building
PITTSBURGH, PENNA.
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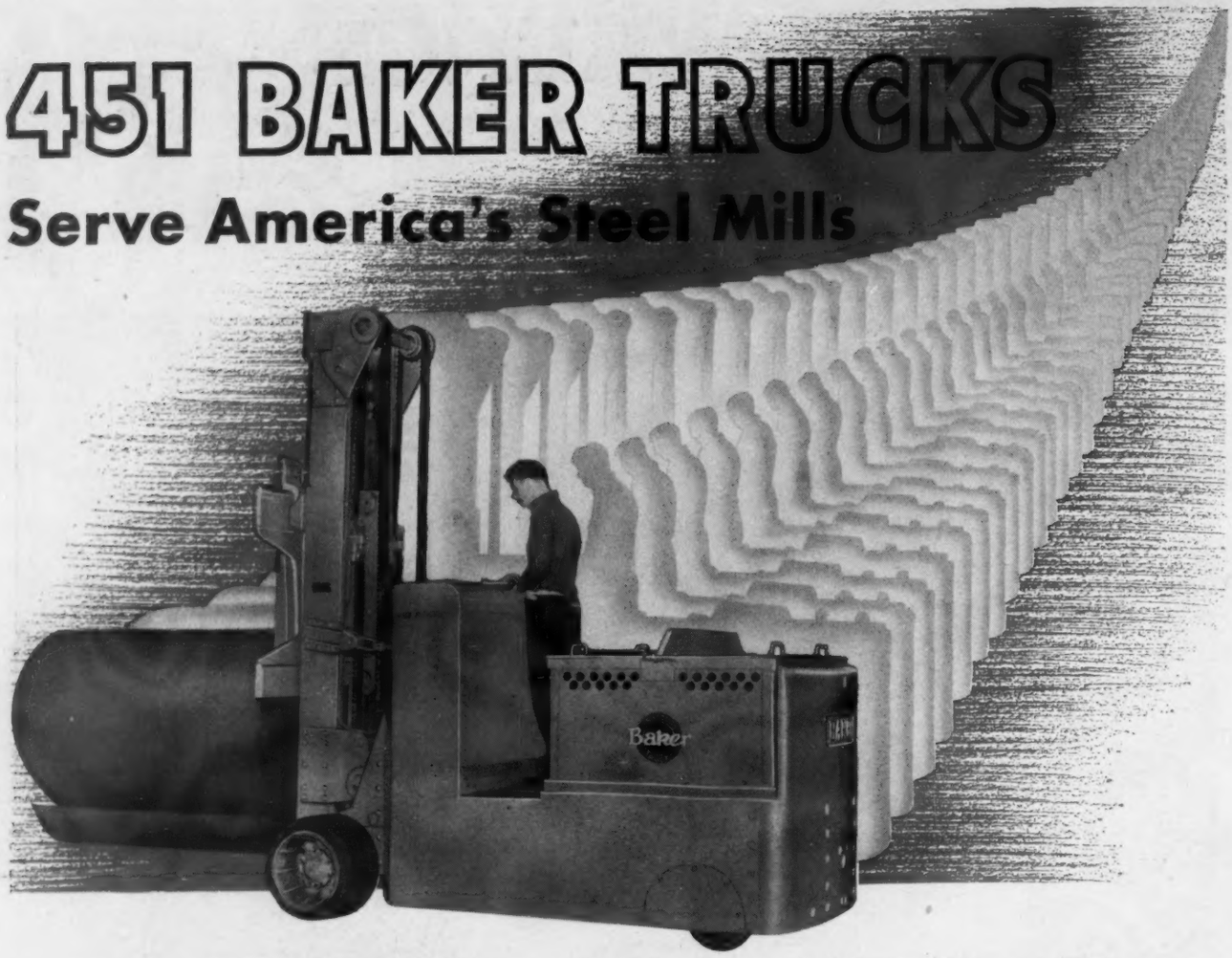
451 BAKER TRUCKS

Serve America's Steel Mills



Of 84 mills using Baker Trucks, 62 have bought 2 or more — 11 have bought 10 or more and 4 have bought more than 50!

● The men who make Steel know what they want when they buy industrial trucks. They prefer Baker Trucks because they know, among other things, how much high cost alloy steel goes into their construction. They know that the Baker Heavy Duty Truck has one of the strongest drive axles ever built into any industrial truck. They know, from personal experience, that Baker Trucks have the stamina that assures dependable performance and low maintenance under the gruelling conditions in their mills.

Because of the increased demands for Baker Trucks in Defense Production, we recommend that future requirements be anticipated now.

BAKER INDUSTRIAL TRUCK DIVISION
of the Baker-Raulang Company
2167 West 25th Street • Cleveland, Ohio

Baker has pioneered many improvements in Steel Handling

Cooperating with steel mill engineers, we are constantly developing and introducing new features to step up efficiency of steel handling. Outstanding Baker contributions are:

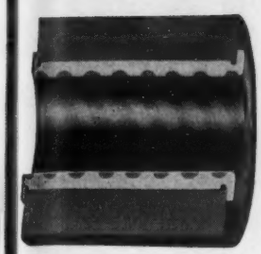
Ram Truck for handling coils
Center-Controlled Truck
Articulated Sheet Handler

●

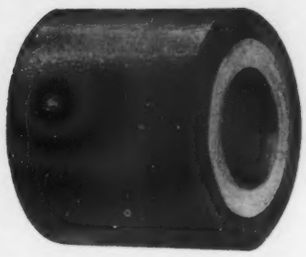
Be sure to visit the Baker exhibit, booths 134-136, at the Iron and Steel Exposition in Cleveland, Sept. 23–25, 1941.

Trade mark Registered U. S. Pat. Off.
Baker INDUSTRIAL TRUCKS
In Canada: Railway and Power Engineering Corporation, Ltd.

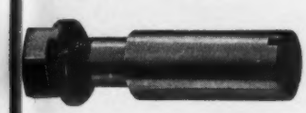
WHY AJAX FLEXIBLE COUPLINGS LET YOU THROW AWAY YOUR OIL CAN...



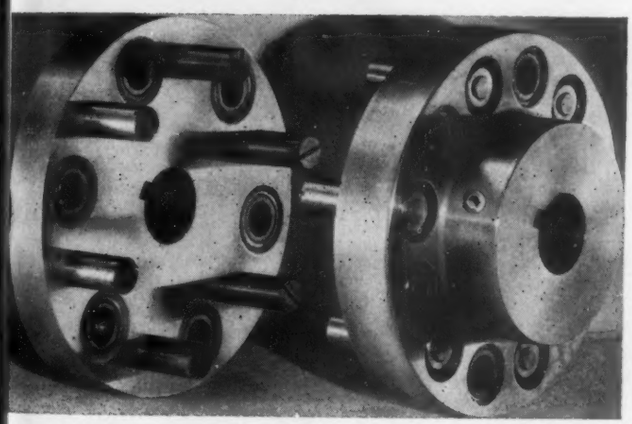
Cross section showing rubber bushing and flanged graphite-bronze, self lubricating bearing.



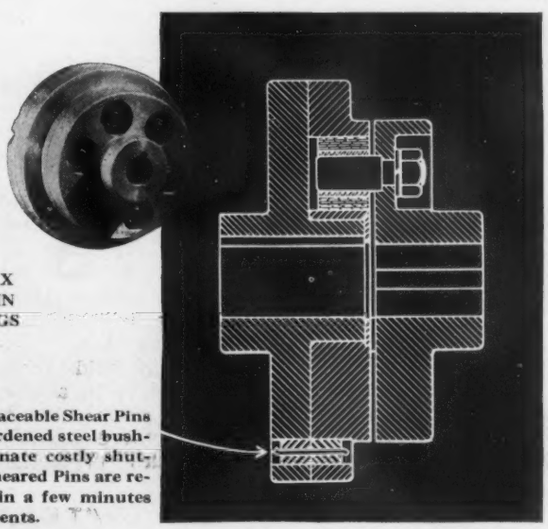
Ajax Rubber Bushings are cold-vulcanized to bronze bearing—no friction, scuffing, shear or wear on rubber.



Alloy steel studs hardened and ground insure accuracy. No metal flexing parts to wear or fatigue.



Showing Ajax Flange assemblies before mating. Precision manufacture makes it practical to line up driving and driven machines by using a steel scale on the outside diameter of flanges.



HOW AJAX SHEAR PIN COUPLINGS Protect Against Overloads

Easily replaceable Shear Pins held in hardened steel bushings eliminate costly shut-downs. Sheared Pins are replaceable in a few minutes for a few cents.

Men who have to keep machines running appreciate how Ajax rubber-bushed, graphite-bronze bearings eliminate difficult lubrication problems set up by centrifugal force and constant flexing at high speeds and heavy loads. Ajax couplings combine positive drive, resilient protection against misalignment, free end float, no noise—no backlash, no lubrication worries.

Ajax Flexible Couplings are built in semi-steel and forged steel types.

Write for Data Book giving complete specifications on all sizes of standard, shear-pin, and special models.

AJAX FLEXIBLE COUPLING CO.

4 ENGLISH ST., WESTFIELD, N. Y.

SALES OFFICES IN:

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Cincinnati	Indianapolis	Minneapolis	St. Louis	Syracuse
		Montreal		

Also Manufacturers of Vibrating Conveyors and Screens

Industrial Equipment

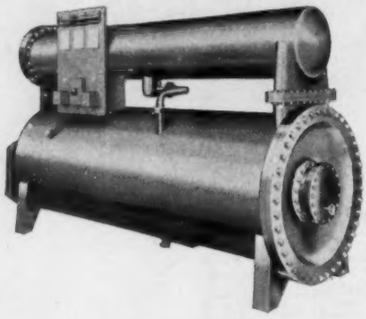
500-Ton Press

■ Cleveland Punch & Shear Works Co., 3917 St. Clair avenue, Cleveland, announces a new 4-point press which measures 108 inches between uprights and exerts a pressure of 500 tons. It operates at the rate of 14 strokes per minute, has a 24-inch stroke and 6-inch adjustment to the slide. The gears, which are located in the box type crown together with

the drive unit, run in oil, an overflow limit in all gear housings being provided to permit the excess oil to return to the reservoir in the slide. All bearings are lubricated by an automatic power operated pump, using pressure feed lines and return to the sump. The press is equipped with an electrically controlled, hydraulically operated friction clutch and brake, the flywheel being provided with a separate air brake. The slide is counterbalanced by air, the cylinders being enclosed in the uprights.

Compressor

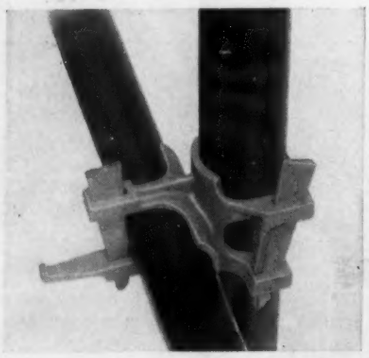
■ Trane Co., La Crosse, Wis., announces a 50-ton turbo-vacuum compressor which is constructed along the same lines as the other sizes and possesses the same inherent characteristics. It is a hermetically sealed, low pressure water chiller constructed with two cylindrical steel shells. A motor with all impellers on a single shaft is contained within the lower shell with the water chilling coil, while



the upper shell houses the condenser coil. All parts of this unit are combined in one unit. This holds friction to a minimum and insures quiet and vibration free operation. Weighing approximately 9300 pounds, the unit is 140 inches long, 73 inches high and 44 inches wide. It is ideal for stand-by service and for all process work which does not require temperatures lower than those available with chilled water. The compressor, in reality, is a complete low pressure refrigeration system "in a package".

Couplings and End Connectors

■ Dravo Corp., Neville Island, Pittsburgh, announces a new product which consists of couplings and end connectors, by means of which standard pipe can be used for erecting scaffolding. Referred to as Quick Lock couplings and end connectors, the development enables special rigs to be built to the exact size and shape desired. The end connector is made to fit standard pipe used for tubular scaffolding and staging. The end



connectors screw snugly on the threaded pipe and the lug engages the recessed member, providing a rigid union. The construction of the equipment provides maximum flexibility for holding the scaffolding members at the proper angles for any part of the structure. Jaws are hinged, so that couplings may readily be applied at any point in the scaffolding or staging.

Cabinet Pedestal for Bench Type Drill Grinder

■ William Sellers & Co. Inc., Sixteenth and Callowhill streets, Philadelphia, have placed on the market a cabinet pedestal for bench type drill grinders in which ample space is provided for tools. In addition, it also provides plenty of room on its top for operation of the machine. The pedestal measures approximately 31 inches from floor line to top. The main pedestal is constructed of sheet steel of sufficient weight to form a vibrationless base for the

machine. A hinged steel door provides access to the storage compartment. Top of pedestal is constructed so that the base level of the machine may be raised by the simple addition of a block under the machine.

Signal Arrester

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new single-pole porous block signal arrester for protecting low voltage, low energy systems against insulation breakdown and apparatus failures. Known as the RV Autovalve arrester, it operates quickly and is capable of discharging high currents.

It can be used on direct current circuits up to 75 volts and alternating current circuits up to 175 volts. Its internal elements consist of a porous block with a series gap formed by a mica spacer separating two metal electrodes. A plate spring holds these elements firmly in place in a dust and moisture proof cover. Ample discharge capacity of more than 10,000 amperes provides protection

"Indoor daylight" in this plant is provided by fluorescent industrial units equipped with 48-inch G-E MAZDA F *Daylight lamps.*

V MEANS VISIBILITY AND VICTORY

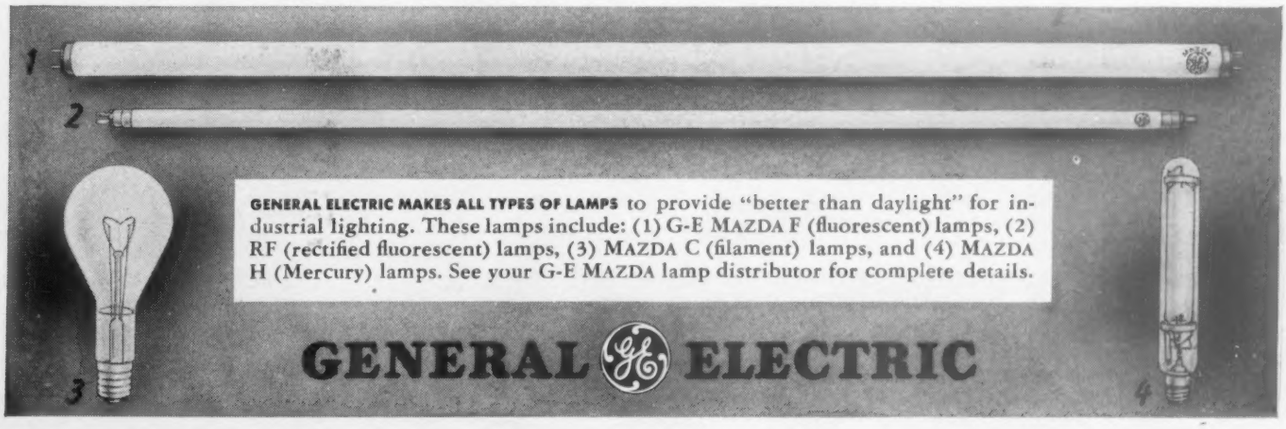
IN MODERN DEFENSE PLANTS LIGHTED WITH G-E MAZDA F "INDOOR DAYLIGHT!"

MORE THAN 50 FOOTCANDLES of cool, even "indoor daylight" floods the screw machine department of this defense industry . . . one of the many plants that are using G-E MAZDA F (fluorescent) lighting to help craftsmen see better and do more accurate work without loss of time and waste through error.

Find out how General Electric can help you speed production, reduce errors, and improve morale in your plant with higher level lighting that is "better than daylight" because it is efficient, economical, and dependable 24 hours a day. Your local electric service company or your G-E MAZDA lamp distributor will show you how to get 50 to 100 footcandles of light, either with incandescent, mercury, RF, or G-E MAZDA F lamps.

• • •

For further information, write General Electric Company, Dept. 166-S-G, Nela Park, Cleveland, Ohio.



GENERAL ELECTRIC MAKES ALL TYPES OF LAMPS to provide "better than daylight" for industrial lighting. These lamps include: (1) G-E MAZDA F (fluorescent) lamps, (2) RF (rectified fluorescent) lamps, (3) MAZDA C (filament) lamps, and (4) MAZDA H (Mercury) lamps. See your G-E MAZDA lamp distributor for complete details.

from lightning surge currents. Repeated discharges do not impair the arrester's characteristics.

Lighting Units

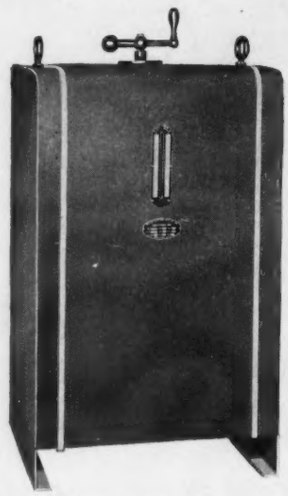
■ Hygrade Sylvania Corp., Ipswich, Mass., has placed on the market continuous row Miralume fluorescent lighting units, designed to provide ultra-efficient lighting for industrial operations. These, designated F-104, F-208, F-154 and F-308 may be joined end to end with like units or with one another to form a continuous wireway enclosure. Units are available either with end caps for individual mounting or with a connecting band for continuous row assembly.

Their reflectors are attached to the top housing by fittings which cannot break up or chip the porcelain reflecting surface, and starters are located in the top housing. Miralume F-104 is a 100-watt unit, complete with two 40 watt T-12 fluorescent lamps. Its overall length is 53 3/16 inches and its width is 13¾ inches.

Miralume F-208 consists of two F-104 reflectors joined end to end on a single channel housing. Its overall length is 106 1/16 inches. Miralume F-154 is a 150-watt unit, complete with three 40 watt T-12 fluorescent lamps. Its dimensions are 53 3/16 x 13¾ inches. Miralume F-308 consists of two F-154 reflectors joined end to end on a single channel housing, measuring 106 9/16 inches.

Production Welders

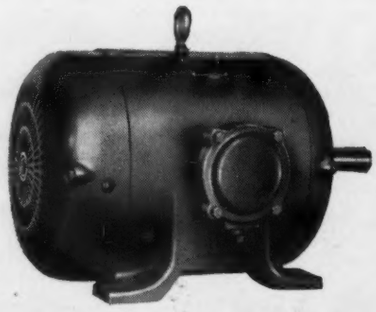
■ Miller Electric Mfg. Co., Appleton, Wis., has introduced a new line of alternating current welders for production work. Including four models, the line serves a twofold purpose. The units, when not in use as arc welders, can be used to correct the power factor of present installations. They employ class B insulation and feature two open circuit voltages—80 and 100. The higher voltage is an advantage when welding with alloy electrodes, and the lower voltage is sufficient on general work. The amperages, shown by the indicator on the front



of each welder cabinet, may be adjusted without breaking the arc simply by turning the ball crank handle which gives an infinite number of heat stages. The welders are built in 300, 400, 500 and 600 ampere sizes.

Explosion-Proof Motor

■ Century Electric Co., 1806 Pine street, St. Louis, has placed on the market an explosion-proof motor of



new design to meet specifications for class I, group D installations, where surrounding atmosphere is charged with explosive quantities of

"We Put that Solder Trouble up to Kester—

THEY SOLVED OUR PROBLEM RIGHT AWAY"

Perfect soldering results depend largely on having the *right combination* of alloy and flux, each in proper quantity, to do the job required. Kester Cored Solders come in 100 different solder alloys, each available with 10 different fluxes, in 80 different strand-sizes and 4 different core sizes. The possible combinations are endless, and *one* of them is exactly right for your work.

Kester technicians can answer any solder question quickly. They'll gladly tell you the best solder formula for any job—the one combination that will get best possible results. To obtain this important information, simply write Kester a brief description of your soldering operations—and your Kester Solder Prescription will go forward at once. The service is free and there is no obligation.

KESTER SOLDER COMPANY

4222 Wrightwood Ave. Chicago, Illinois

Eastern Plant: Newark, N. J. Canadian Plant: Brantford, Ont.

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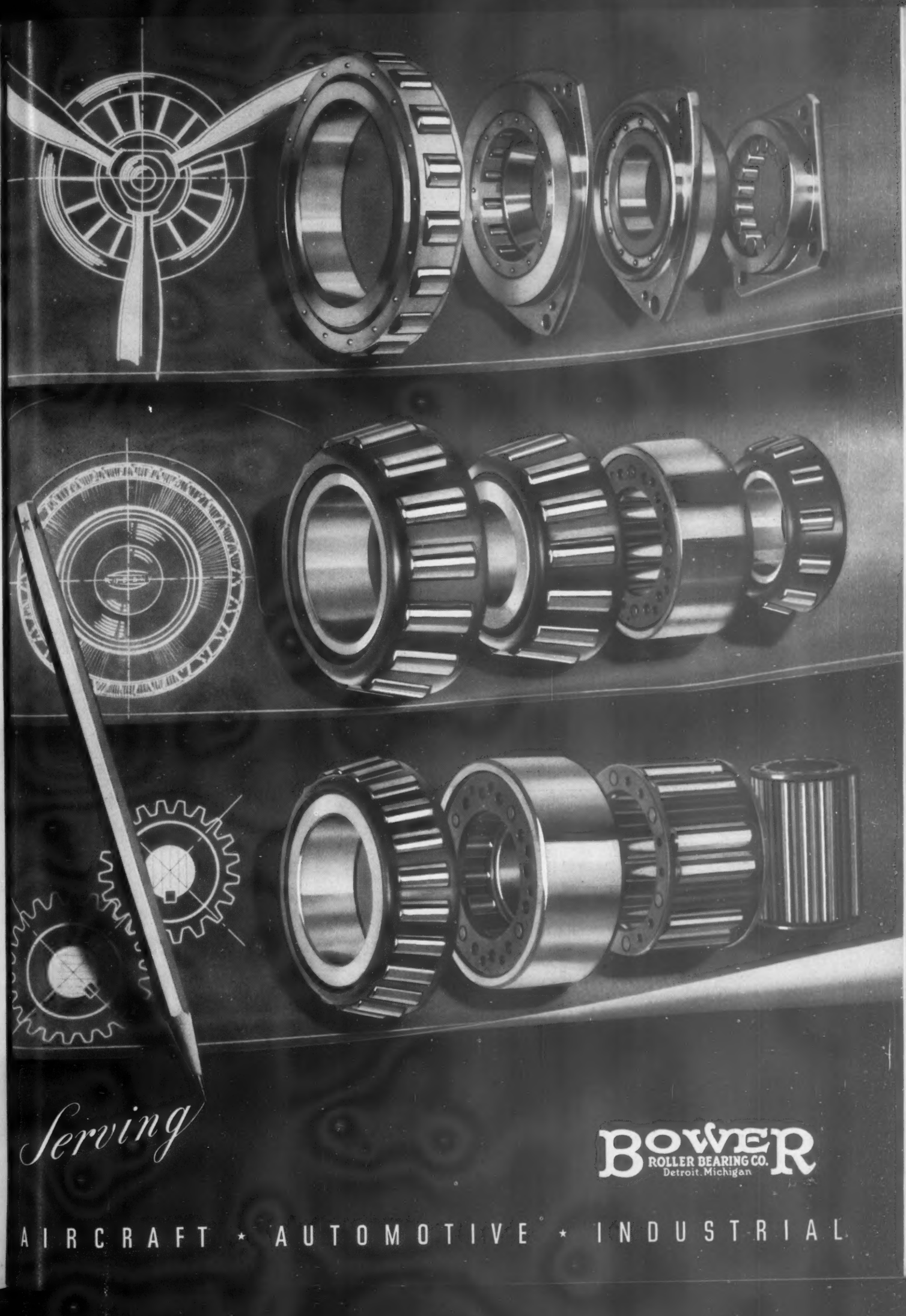
STANDARD FOR INDUSTRY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BOWER
ROLLER BEARING CO.
Detroit, Michigan
AIRCRAFT ★ AUTOMOTIVE ★ INDUSTRIAL

acetone, alcohols, gasoline, lacquer, naphtha, natural gas, petroleum or solvent vapor. It is constructed so it will resist the pressure of an explosion of any of these gasses should one occur inside the motor and not cause an explosion in a similar atmosphere outside the motor.

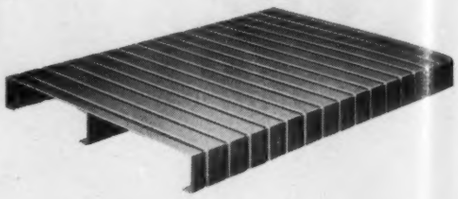
Spring for Scales

■ All-Weather Springs, 72 Washington street, New York, has introduced a new spring for use in spring scales, aeronautical instruments and other spring actuated instruments which must be used in localities where they are exposed to quite wide variations in temperature—sudden heat or cold.

It is said to have no temperature error and utilizes the property of a 36 per cent nickel steel to become stiffer as its temperature increases. For every increase of 100 degrees Fahr. in temperature this self-compensating unit can be held constant to 0.02 per cent.

Single Face Pallet

■ Union Metal Mfg. Co., Canton, O., announces a new all-steel light weight pallet for freight handling between customer and consumer. It is intended to be used as a returnable package inasmuch as the return freight cost is small in comparison with the cost of a new wood pallet. Its top deck and legs are formed in one piece and the number of channel spacer supports depends upon the width and load. The legs



and spacers are provided with a return bottom flange adding further strength and serving as a floor protector. The gage of metal used in the pallet depends upon the strength requirements, likewise customer's needs determine the size. Double-faced pallets can be furnished by the addition of a slatted or solid bottom deck. These units are suitable for handling with fork trucks.

Nontilting Mixer

■ Chain Belt Co., 1600 West Bruce street, Milwaukee, has placed on the market a 3½S nontilting mixer of the end discharge type mounted on two pneumatic tired wheels. It is equipped with a 31/3-horsepower air-cooled motor and can be fur-

nished with or without water tank. Some of its features include a 6-inch lower shoveling height, a self-cleaning hopper with no hopper gate, a sure shimmy hopper control, die formed pressed steel drum heads with die formed pressed steel polished drum tracks and a Rex chain belt drive.

Flexible Coupling

■ Falk Corp., Milwaukee, announces a new Airflex flexible coupling for connecting diesel, oil, gasoline, or gas engines to any type of driven machinery. It also can be used with motor-driven compressors, single-cylinder pumps and

7 lifting advantages

In SHAW-BOX ELECTRIC HOISTS

are seven features which mean speed, efficiency and economy in lifting.

They are the results of many years' engineering and represent the most modern thought in hoists.

Here they are:

1 — "One-point" Lubrication
2 — Interchangeable Suspension
3 — "Fool-proof" Upper Stop
4 — Two-gear Reduction Drive
5 — Hyatt Roller Bearings
6 — Enclosed Construction
7 — Ball Bearing Motor

No other electric hoist has all these saving features yet you pay no price premium for them. Specify "Shaw-Box" electric hoists for your hoists and let this superb lifting mechanism go to work for you.

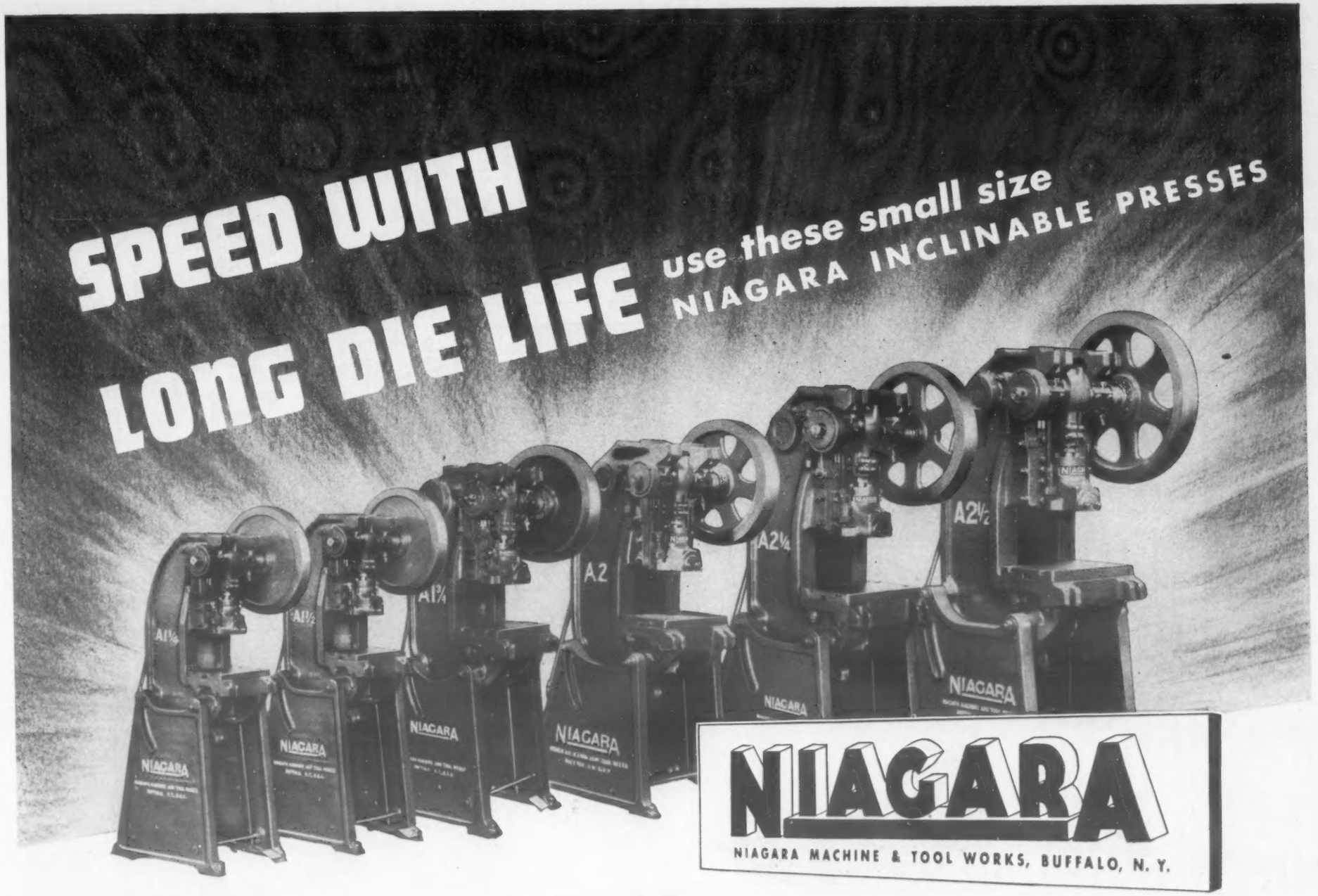
There are sizes for all jobs — for yours. They come in lifting capacities from 250 pounds to 20 tons in combinations and arrangements to fit every demand of industry for hoists.

Thousands of installations throughout the country testify to the reliability and working efficiency of SHAW-BOX electric hoists.

Send for catalog with completely illustrated information. It will show you how to lift more — quicker — for less.

Makers of all types and sizes of Electric and Hand Operated Cranes and Electric Hoists . . . Send all your Crane and Hoist inquiries to Shaw-Box!

SHAW-BOX CRANE & HOIST DIVISION
MANNING, MAXWELL & MOORE, INC.
MUSKEGON · · MICHIGAN


SPEED WITH
LONG DIE LIFE
use these small size
NIAGARA INCLINABLE PRESSES
A1½
A1½
A1¼
A2
A2¼
A2½
NIAGARA
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NIAGARA MACHINE & TOOL WORKS, BUFFALO, N. Y.

other driven equipment of a similar fluctuating torque nature. It consists of a special resilient rubber gland lined with a premolded, prevulcanized cylindrical section treated to prevent air loss. This lining is covered with multiple alternating layers of durable fabric and live rubber, the entire gland being permanently bonded to steel inner and outer rims. The gland is inflated to proper pressure through a thread valve which will take any hand pump fitting or air nozzle. The degree of elasticity in this coupling can be varied by changing the air pressure. This frequently eliminates the necessity for adjusting the setting of the connected units, or making changes in shaft diameters to alter the torsional characteristics of the drive system. The coupling is made in about six types. Type AR — both hubs external is for new installations where a gap between shaft ends equivalent to the width of the coupling gland can be provided. Type AR—with one hub inverted is for use on existing applications where the gap between shaft ends is small. Type FM is for equipment having the flywheel on driving or driven shaft. It allows the gland to be bolted directly to the flywheel. Type AR, with thrust unit, is intended for marine propulsion applications or where it is desired to transmit thrust through the coupling to an adjacent thrust bearing. Type XR, high-speed type, is for applications where the speed is beyond the allowable for the basic AR type. The sixth type, the disconnecting coupling, is for dual drives.

DRAVO MATERIAL HANDLING EQUIPMENT

Shown here are eight outstanding Dravo-built rigs—each an answer to a specific problem involving material handling.

Complete coordinated facilities for engineering, fabricating and erecting efficient structures are available at Dravo. Consult with us on the building of new terminal facilities — or the modernization of existing equipment.

DRAVO CORPORATION
ENGINEERING WORKS DIVISION
GENERAL OFFICES AND SHOPS: NEVILLE ISLAND, PITTSBURGH, PA.

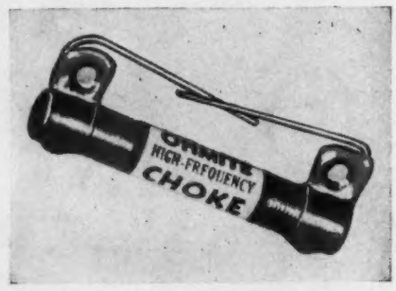
Heavy-Duty Shear

■ Beverly Shear Co., 3004 West 111th street, Chicago, has introduced a redesigned heavy-duty shear which features a ball-bearing hold-down device. The latter greatly increases the stability of the unit in acting as a guide when metal is passing over the table of the shear. It enables metal to be turned in any

direction to make any shaped cut. The ball joint of the hold-down offers no resistance in turning the metal and makes possible the cutting of high polished metals without marring. Known as Beverly, B-3, the shear is highly efficient in cutting 3/16-gage mild steel and 10-gage stainless steel. Its blades are of high-carbon high-chromium steel content.

Plate Choke

■ Ohmite Mfg. Co., 4835 Flournoy street, Chicago, announces a new 2½ meter band R. F. plate choke especially applicable to transceivers and 2½ meter mobile transmitters. It is single layer wound on a low

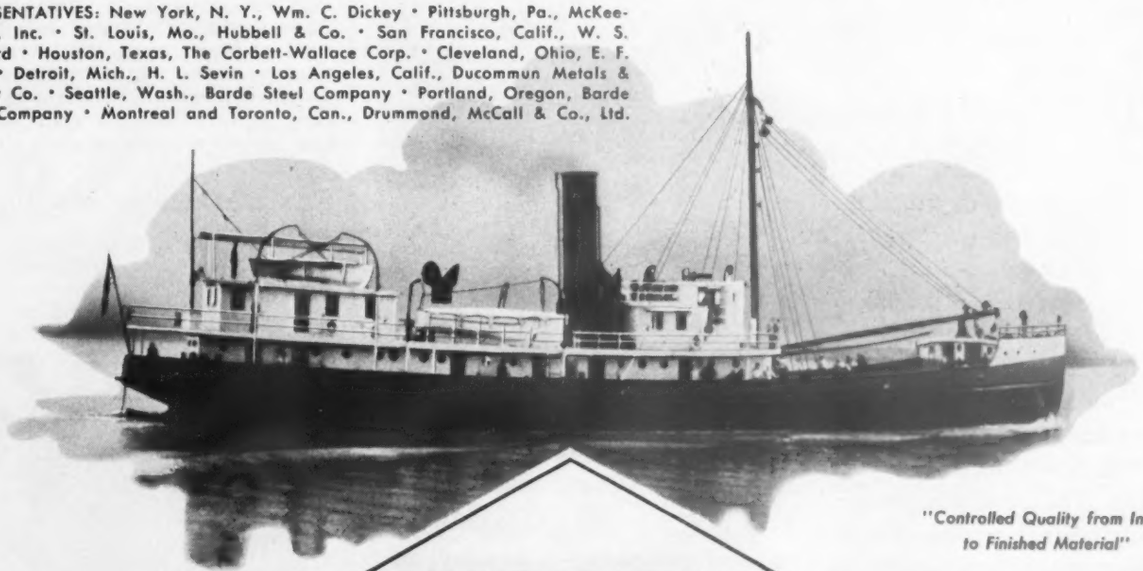


power factor steatite tube, and the winding is covered with a moisture resisting insulating material. Because of the single layer winding, the voltage differential between ad-

HELPING POINT THE FINGER THAT BECKONS 'HOME'

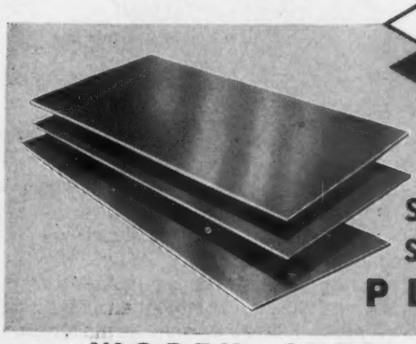
The 770-ton, twin screw lighthouse tender S. S. MISTLETOE, covers the sea-ways in the service of the United States Coast Guard. Designed by the Bureau of Lighthouses, the MISTLETOE is 173′ 0-¾″ in length with a 32′ moulded beam and loaded draft of 8′ 6″ . . . propelled by two 1063 HP triple expansion steam engines. Builders were the Pusey & Jones Corporation and the drum shells and heads for the boilers supplied by the Babcock & Wilcox Company were fabricated from WORTH SHEARED STEEL PLATES.

REPRESENTATIVES: New York, N. Y., Wm. C. Dickey • Pittsburgh, Pa., McKee-Oliver, Inc. • St. Louis, Mo., Hubbell & Co. • San Francisco, Calif., W. S. Hanford • Houston, Texas, The Corbett-Wallace Corp. • Cleveland, Ohio, E. F. Bond • Detroit, Mich., H. L. Sevin • Los Angeles, Calif., Ducommun Metals & Supply Co. • Seattle, Wash., Barde Steel Company • Portland, Oregon, Barde Steel Company • Montreal and Toronto, Can., Drummond, McCall & Co., Ltd.



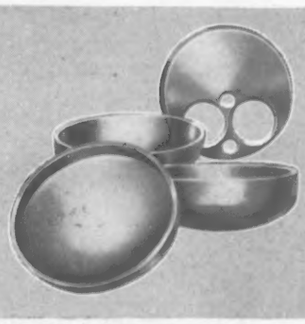
"Controlled Quality from Ingot to Finished Material"

WORTH



SHEARED STEEL PLATE

FLANGED and DISHED HEADS



WORTH STEEL COMPANY • Claymont, Delaware

jacent turns is low and the possibility of breakdowns between turns is eliminated. The design is such that no portion can resonate independently from any other portion. Mounting is by means of the wire leads.

Tube Contactor

■ Weltronic Corp. East Outer drive, Detroit, has introduced a new Stat-O-Tron tube contactor for use in connection with spot, projection and butt welders. Simple to install, it can be used even on small welding equipment. Only four electrical connections complete installation in the field—one to the primary circuit of the welding equipment, one to the power line, and two to the timer or foot switch.

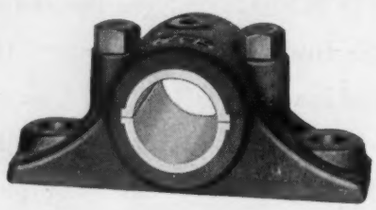
Because of the use of the new power tube, water cooling of the contactor tubes has been made unnecessary. The contactor contains two of these air-cooled tubes. When the door to the contactor is open, a glance at the glass tubes reveals whether or not they are firing. A metal guard around the tubes in form of a grounded screen, prevent accidental shock.

Firing is accomplished by a static charge, obtained from a band around the outside of the tube and creating a cathode spot within the tube. A thermostat in the anode circuit of each tube prevents damage in case of overload. These thermostats are series connected with the coil of the firing relay, to open the circuit in case of overload. When a firing relay is not used, this connection is made to the pilot circuit of the timer.

The contactor is available with or without firing relay, the relay operating on any coil voltage of from 24 to 550 volts. Tubes will operate on 220, 440 or 550 volts without any internal changes in the contactor.

Journal Bearings

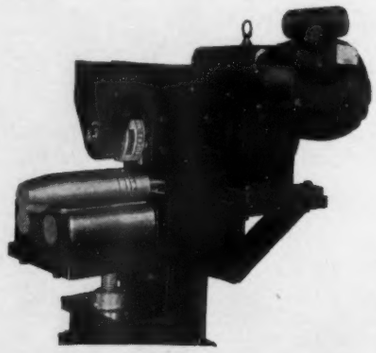
■ Jeffrey Mfg. Co., Columbus, O., has introduced a new line of solid and split journal bearings. Of accurate dimensions with modern rounded lines and smooth gun metal finish, these have machined bases and faced-ends. The babbitted bores



are broached to smooth hard surface and require no "wearing in." Both styles are tapped for grease cups or pressure fittings. A storage groove in the top of end bearing provides proper distribution of lubricant. In addition, the split bearing has feeder grooves on each side.

Shell Marking Machine

■ M. E. Cunningham Co., 115 East Carson street, Pittsburgh, has placed on the market a motor-driven No. 1 shell marking ma-



chine for marking around the circumference of rough forged or finished shell. Made of steel plates, it is available either as a pedestal or bench model. Its marking die is made to take either individual interchangeable type or solid stamp inserts. Both the die and inserts of special steel to assure maximum service. The marking die rotates

Andrews Quality

PROVED AT ALL THREE CRITICAL POINTS

IN THE STEEL PLANT

IN YOUR PRODUCTION

IN PRODUCT PERFORMANCE

ANDREWS STEEL

It is not enough to prove the quality of the bar, billet or slab at the Andrews plant in the laboratory. That is but the initial test. The second is equally important—how Andrews steel acts under your production processes and methods, and how well it fits into the requirements of your product. The third, performance, is the vital trial ground. This is the most critical and exacting of all, where your product must demonstrate its ability to give trouble-free, dependable, day-in and day-out service.

Andrews steel is manufactured with this third great test in mind. That is why so many Andrews customers find it to their advantage to standardize on Andrews steel — and enjoy the benefits of triple-proved quality at all three critical points—in the steel plant—in your production—in the hands of the consumer.

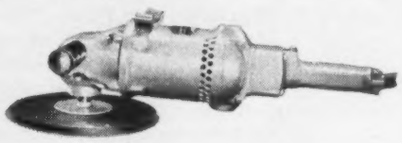
THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

ANDREWS PRODUCTS IN BASIC OPEN-HEARTH CARBON AND ALLOY STEEL:
Bars • Plates • Universal Mill Plates • Sheet Bars • Billets • Blooms • Slabs

continually, thereby eliminating need for clutch and speeding up production. A red and green colored plate on outside of rotating shaft indicates when die is in position to allow insertion of shell. Die is geared to stamp a maximum of 18 shell per minute.

Heavy Duty Sander

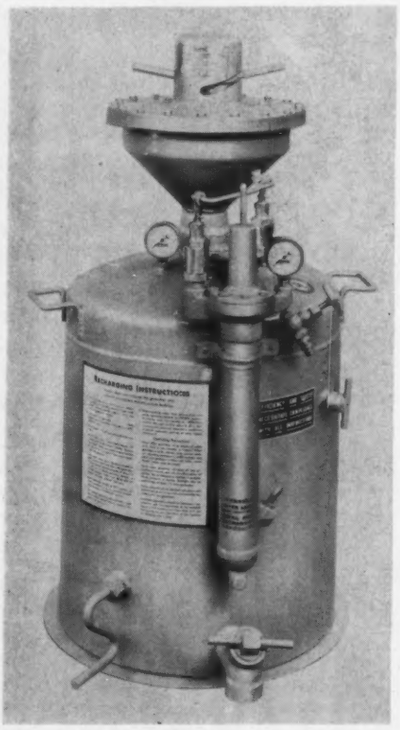
■ Black & Decker Mfg. Co., Towson, Md., has placed on the market a new heavy-duty 9-inch production sander designed for faster operations. Its improved fast spindle lock enables pads and abrasive disks to be changed quicker, and its spiral-bevel gears provide smooth power with less friction



and noise. The sander motor operates on either alternating or direct current. Both its switch and commutator are sealed against dust and grit. The unit is 2½ pounds lighter than former models and incorporates an adjustable side handle for right or left hand use.

Acetylene Generator

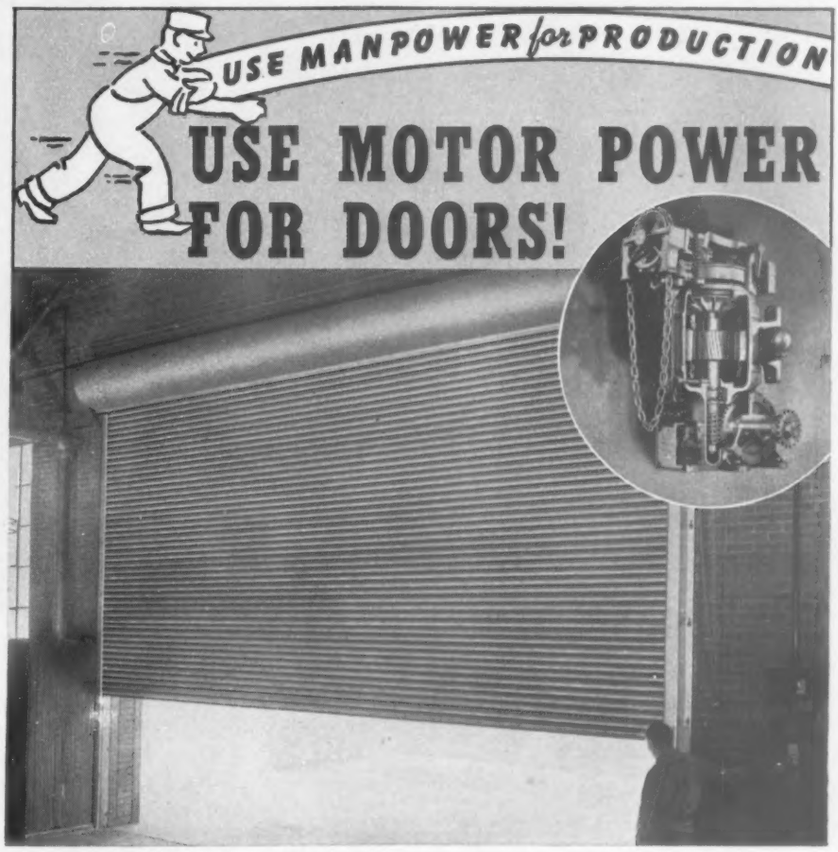
■ The Linde Air Products Co., 30 East Forty-second street, New York, has introduced a new portable acetylene generator for use in oxyacetylene welding and cutting. Known



as the Oxweld MP-10, it will deliver 30 cubic feet of acetylene per hour, and is suitable for welding metal up to ⅜-inch thick, and for cutting steel up to 5 inches thick. It is designed for maximum portability, and can readily be moved about or from the shop for outside jobs. The generator is easily recharged, and is simple to operate. Generation of acetylene is started, set for regular operation and stopped by rotating a pair of handles at the top of the generator. Pressure of acetylene is controlled by a regulator and a separate pressure gage indicates the pressure within the generating chamber. Other features include two relief valves which vent any excessive pressures automatically and a hydraulic back-pressure valve which prevents any reverse flow of gas. A revolving agitator blade at the bottom of the generator facilitates removal of residue from the generating chamber during recharging. The generator weighs only 250 pounds when charged, and measures 3 feet 2½ inches in height.

Marking Ink

■ The AcroMark Corp., 251 North Broad street, Elizabeth, N. J., is offering a new ink for marking Vinylite. Furnished in any standard color—silver, gold, black, white, blue, red and other colors—it is



You save TIME and MANPOWER for production when you use Kinnear Motor Operated Steel Rolling Doors. With them, you can close or open any doorway quickly — from control switches placed at as many separate and convenient points as you desire—by simply touching a button. Now is the time to install this rugged, all-steel protective door with the efficient, interlocking steel-slat curtain* the door that opens straight upward and saves floor and wall space by coiling compactly out of the way above the opening. Any size, for old or new buildings. Write for details today! Address The Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, Ohio.

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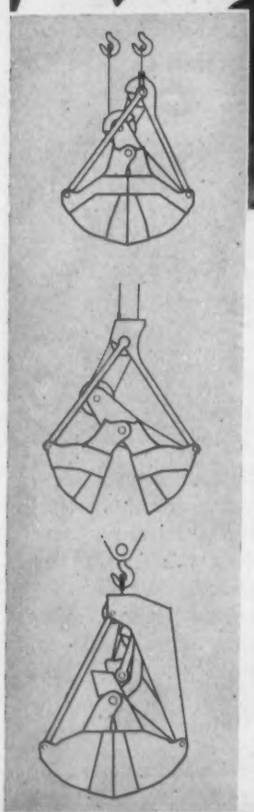
compounded in a paste form and used as a regular printing ink. The ink penetrates the Vinylite surface sufficiently to attach itself and the color content adheres even under rigid tests such as rubbing, weather tests, salt water tests and all natural conditions. It is quick drying and is particularly adaptable to marking or printing designs, lettering or numbering and specifications.

Magnetic Separator

■ S. G. Frantz Co. Inc., 161 Grand street, New York, has introduced a new model PQ-4 permanent magnet FerroFilter of greater capacity for removing fine iron and steel particles from circulating lubricating oil systems. Having a capacity of 40 gallons per minute, it is particularly adapted to roll grinder lube oil systems to reduce wear on ways.

The filter is placed in the oil pipe line and becomes part of the circulating lube oil system. It consists essentially of a stack of magnetized screens enclosed in a cylindrical casing through which the oil flows. These have triangular mesh openings of about ⅛-inch—their design presenting hundreds of feet of strongly magnetized edges to the oil. The edges comb and recomb the oil, the magnetic particles being held firmly to the screen edges until cleaned. The FerroFilter catches iron and steel particles as microscopically fine as one micron (1/25,000-inch diameter).



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Heating of Ordnance

(*Concluded from Page* 86)

Pusher Type: A typical pusher-type billet heating furnace is shown in Fig. 5. In this case, the billets are 3½ inches square by 15 inches long, weighing 52 pounds each. These are pushed through the furnace in three rows at the rate of 45 pieces per hour, giving a production of 2340 pounds per hour. This is an oil-fired furnace, held at a temperature of 2300 degrees Fahr. The heated billets drop from the sloping end of the furnace to a conveyor which transfers them to the forging presses.

Projectile Nosing: The next step in the manufacture of projectiles consists of drawing in the open end and is known as nosing or tapering. The idea is represented by the sketch in Fig. 6. Some of the smaller sizes are nosed without heating, but for the most part they are raised to a temperature of approximately 1850 degrees Fahr. for this operation. Sometimes the work is heated in individual silicon carbide muffles and at other times a rotating-type furnace is used in which the projectiles are heated in open flames. Thus the furnace may be either a continuous or a batch-type unit.

A sketch of a furnace using silicon carbide muffles for this purpose is shown in Fig. 7. The projectiles are inserted in muffles and the open end heated to a temperature between 1800 and 1850 degrees Fahr. In this particular installation the projectiles treated are of the 90 to 105-millimeter type. There are twelve holes in a straight line which gives a heating capacity of 40 pieces per hour.

A type of furnace that has been in use for a long time is the rotating nosing furnace such as shown in Fig. 8. The projectiles are inserted part way through the sides of the furnace, open end first, so as to heat the first 9 inches from the open end. In this case, it is the outside of the furnace itself which revolves, thus carrying the projectiles around to the point of discharge. The furnace is heated by means of a large variable flame burner which fires through the furnace roof and the work is revolved by a star wheel to assure uniform heating. A furnace of the type shown will have a capacity of about 2250 pounds per hour.

Fig. 9 is a view of a typical unit

of this type. Some of these furnaces are provided with means for removing the heated shell progressively as the furnace revolves. In other places the shell is withdrawn manually. Regardless of supplementary equipment, this type of furnace is particularly suitable for mass production and is being used extensively at the present time.

Directory of Canadian Industry and Trade

■ *Canadian Trade Index*, 1941; cloth, 840 pages, 6½ x 10 inches; published by Canadian Manufacturers' Association, Toronto, Ont., for $6.

An authoritative source of reference on what is made in Canada and who makes it. The current issue has been revised thoroughly as to names, addresses and specifications. The export section has been completely revised and has a foreword by Hon. James A. McKinnon, minister of trade and commerce, Ottawa, Ont., on the importance of export trade.

The usual five sections are included; first is a special export presentation; Part II is an alphabetical list of manufacturers with addresses, branches, representatives, trade marks, brands and similar information; Part III is a directory of Canadian manufacturers, classified by products; Part IV is a similar directory of producers, shippers and exporters of agricultural machinery and similar lines; the fifth section is an alphabetical list of headings in Part III, in French, with parallel English.

A.F.A. Transactions 1940

■ *Transactions of the American Foundrymen's Association*, Vol. 48, 1940, edited by R. E. Kennedy, and N. F. Hindle; cloth, 815 pages, 6 x 9 inches; published by American Foundrymen's Association, 222 West Adams street, Chicago, and available for $3 to members and $15 to nonmembers of the association.

This annual volume of the American Foundrymen's Association contains 32 papers with discussion and three committee reports, presented at its forty-fourth annual meeting in Chicago May 6 to 10, 1940. In addition, the first section is devoted to a summary of proceedings, reports of officers, financial statement and minutes of board meetings. The papers cover a wide range of subjects relating to the four branches of the foundry industry, gray iron, steel, malleable cast iron and nonferrous. Other papers relate to molding sand, clays, refractories, coatings for wood patterns, welding and numerous other phases relating to the foundry industry. Papers deal with both practical and technical sides, and the volume is an important contribution to foundry literature.

Encyclopedia Covering Engineering Field

■ *Engineering Encyclopedia*, two volumes; fabrikoid, 1431 pages, 6 x 9 inches; published by Industrial Press, 148 Lafayette street, New York, for $8.

These volumes present in cyclopedia arrangement material on some 4500 subjects relating to engineering. It supplies information on such subjects as important mechanical laws, rules and principles; physical properties and compositions of a large variety of standard and special metals used in machine construction and other engineering structures, characteristic features and functions of various types of machine tools and other manufacturing equipment and many other varieties of information.

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Dept. of Metallurgical Engineering
Lehigh University

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Tank Engineering

(*Continued from Page* 58)

ment progress are confidential, during the last year improvements in the accuracy of fire of tank weapons of over 1000 per cent have been made possible.

Armor Protection: Naturally, the designer would like to equip his tank with armor of such thickness that it would be impossible for any type of projectile to penetrate it. It is always a great disappointment to the layman to learn that the armor of any tank can be penetrated. However, World war records show 60 per cent of battle casualties resulted from low velocity fragments thrown from projectiles. It is, therefore, obvious that even thin armor provides a great degree of protection.

Armor, unfortunately, is the greatest weight-producing factor in a tank. It offers the greatest problems in machining and fabrication. At the present time, three types of armor are used on our fighting vehicles.

Rolled Face-Hardened Plate: The United States Army uses face-hardened plate. This gives the greatest protection from small bullets up to about .50-caliber. However, it is brittle and is not well suited to withstand the shock of larger caliber projectiles. For lightly armored vehicles it is necessary to use face-hardened plate because this is the only type of thin plate that will keep out bullets from high-powered machine guns. This type of plate can be welded and formed without difficulty.

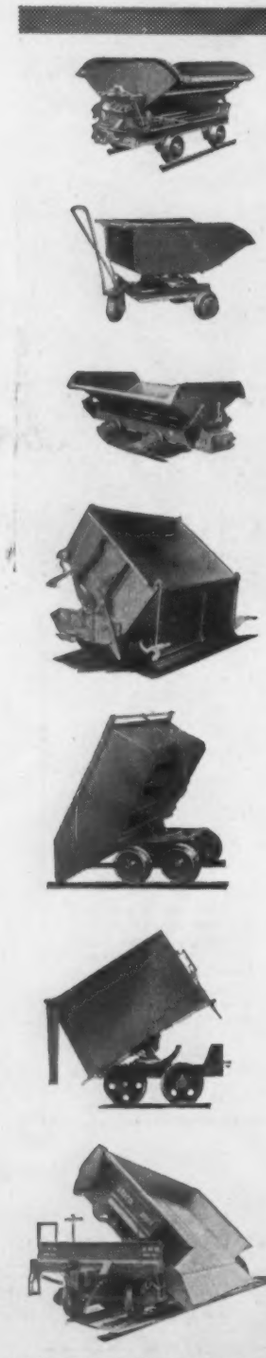
Rolled Homogeneous Plate offers the best ballistic values against projectiles larger than machine gun bullets. It furnishes protection against small arms bullets which cannot penetrate a great thickness. It is also a superior type of plate for absorbing the shocks of heavier caliber cannon projectiles. It can be easily welded or formed.

Cast Armor: The use of cast armor in the United States is increasing. Up to the present time cast armor has been made to give about 90 per cent of the ballistic value of rolled homogeneous plate. Cast armor has the important design advantage that it can be contoured to any desired shape and thus some advantage can be achieved in ballistic values by sloping the plates.

While we welded a tank completely as early as 1933 and made armor plate castings at Watertown Arsenal over a long period of years, welding and casting have entered the field of design extensively only during the last year. The urge to weld or cast comes largely from the desire to eliminate riveted structures which are somewhat weak ballistically. The rapid development of welding of armor during the past year insures that welding will be extensively used in tank manufacture in the future.

The trend of modern armor design is to use thicker plates. But as the armor thickness increases, the weight of the vehicle increases, requiring greater horsepower until the law of diminishing returns soon is encountered.

Mobility is likewise one of the fundamental tank characteristics in that it determines the facility with which the guns of a tank can be brought to the point desired. Mobility depends upon vehicle weight, engine power, track width, vehicle length and corresponding pounds per square inch pressure between the track and the ground. Mobility is of vital importance because the safety of the tank personnel is dependent not only on the thickness and quality of the tank armor, but also upon the tank speed. Thus, if a tank can move at a high rate of speed, it will present itself as a target for a limited time. This will determine the number of shots the enemy anti-tank gunners can fire, which will in turn determine the number of possible hits that can be made. Since a certain number of pene-



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trations can be absorbed before the tank is put out of action, this time factor is of great importance. Hence, the desire of the tank designer is always to secure the greatest possible speed over all types of terrain.

Foreign tank designers have not given speed as high a value as employed here. This has probably been because only engines of relatively lower horsepower have been available. Most European tanks, including German, have only about half the horsepower-to-weight ratio of corresponding American vehicles. Thus American tanks travel much faster than foreign vehicles and will be more difficult to put out of action.

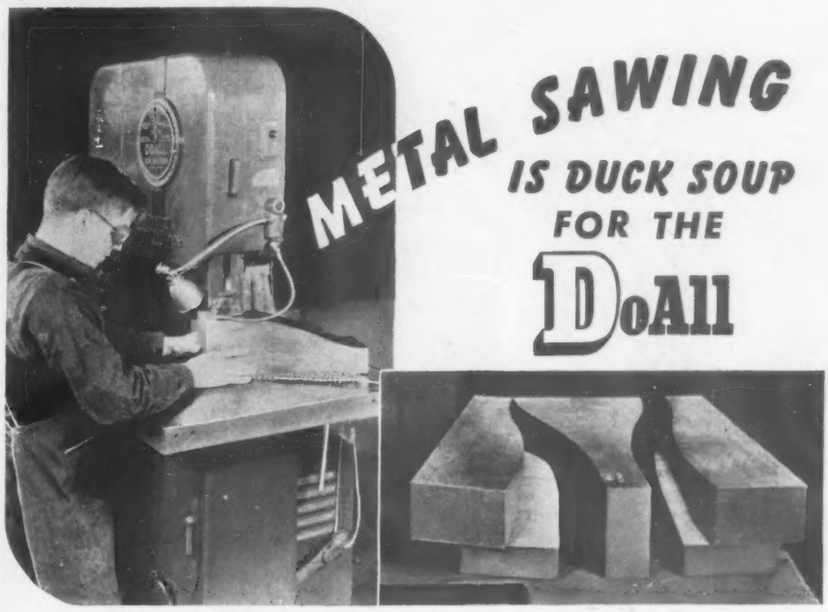
The rule of thumb for power required to drive a tank is ½-horsepower per ton per mile per hour. Thus, 450 horsepower is needed to drive a 30-ton tank 30 miles per hour. We like to keep the horsepower-to-weight ratio about 18 horsepower per ton. This makes it easy to maintain speeds of 10 to 20 miles per hour in sand, mud, on slopes, or over obstacles. The high horsepower-to-weight ratio has been difficult to maintain because the thickening of armor protection results in heavy weight increases without providing the added space for enlarged power plants. If we increase the size of the engine compartment we decrease space provided for fighting, or add on more weight which in turn requires more engine. The size and type of engine required is found in the aviation industry, where we obtain radial air-cooled engines which ideally fill our requirements and are light and compact.

The clutch problem is becoming increasingly difficult as horsepower increases, and especially so in the so-called "heavy tanks". The proper solution appears to lie in the complete elimination of the clutch.

The transmission development has progressed from the sliding gear to constant-mesh to synchromesh. However, any stepped gear manual shifting transmission is far from ideal for tank use because for each gear there is only one point of maximum torque and only one point of maximum power. The great fluctuations in requirements for propelling torque necessitate frequent transmission shifts. These are difficult to accomplish because a tank has no rolling momentum like a truck or automobile and so just about stops dead when driving power is removed during shifting. Several types of electric and hydraulic variable-speed transmissions are being investigated. From these will come the solution to the major-power-train problem.

To turn a tank, it is necessary not only to effect a speed differential between the two tracks but also to set up forces on the tracks which will develop a turning moment sufficiently large to overcome the moment resisting turning. Thus, a clutch brake tractor on most turns requires a brake application after release of the steering clutch. The method for steering must not only be efficient but also must not develop a torque peak which would force a shift of the transmission, for this would destroy the tank's performance.

Attempts have been made to steer tanks by varying the speeds of two engines, each driving one track. But this is faulty since half of the available horsepower is lost when it is needed most and frequently engine compression braking is not sufficient to develop a turning moment. An attempt was made to steer a tank electrically but no provision was made for braking the inside track to develop the turning moment. Obviously a brake on the inside track of the turn is essential. This brake should be of the regenerative type to insure efficiency and the elimination of high torque peak requirements. The controlled differential now employed in American tanks fulfills



On the DoAll, the Hawthorne Metal Products Co., Detroit, Mich., cut the five sections of a die from one block of boiler plate steel 5" thick, 16" long, 14" wide—only 4 cuts of the saw necessary. Time—1¾ hours for each cut, or at the rate of ¼" per minute. Saw used—½" 6 R.H. Speed—150 f.p.m.

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all these requirements satisfactorily.

The tracks provide the ground contact which determines tractive effort, the flotation necessary to negotiate soft ground, as well as the necessary bridge for the road wheels as the tank crosses trenches or other obstacles. The tracks are heavy consumers of power and are subject to abuse and wear and must be able to operate on roads as well as cross country. The United States Ordnance Department has outdistanced the world in the development of tank tracks. In this country we no longer talk of track life in hundreds of miles, but rather in thousands. Power consumption has been reduced by approximately 9 horsepower per ton of weight of vehicle at 20 miles per hour, which figure becomes extremely important when one talks in terms of 28 to 60 tons.

The suspension design is extremely important because of its effect on mobility, the stability of the firing platform, and its cushioning of road shock for crew and mechanism. The articulating bogie system now employed is quite flexible, simple in construction and extremely reliable.

There are a number of other important design problems which must be considered. They are: Fire extinguisher equipment to protect from externally as well as internally ignited flames; air cleaners; engine cooling fan; provision for cold-weather starting; suitable electrical capacity; night lighting for permitting high-speed driving without exposing the tank to view; radio, intertank and distant communication; intertank phone communications; protected vision; ammunition supplies; operating controls; sound proofing; heat proofing; noise deadening; interior safety padding.

U. S. a Natural Leader

It is natural that the United States should take the lead in the design of fighting vehicles since it definitely leads the rest of the world in the development of other types of automotive equipment. Nearly 60 per cent of the parts of American tanks originate in the automotive industry. Today the American tank surpasses those of other countries in the important characteristics of mobility and mechanical reliability. So far as is known, no country possesses vehicles capable of traveling the great distances at the speeds possible with American models.

The construction of light tanks by the American Car & Foundry Co. has been a bright spot in the rearmament program. This company is turning out a number of light tanks each day and production has reached such a satisfactory point that it can be said that no shortages in light tanks can possibly occur under any emergency.

The Ordnance Department had the choice last summer of continuing the manufacture of its medium tank—a very satisfactory vehicle—or of taking a few months to incorporate in this tank the lessons learned from the fighting in Poland, Holland, France and other countries. A redesign was made, and as a result the medium tank which is being built in quantity for the United States Army is a very superior vehicle. At the present time the six American companies manufacturing these tanks are: American Locomotive Co., New York; Pullman-Standard Car Mfg. Co., Chicago; Baldwin Locomotive Works, Philadelphia; Lima Locomotive Works, New York; Pressed Steel Car Co., Pittsburgh; and Chrysler Corp., Detroit.

The new heavy tank involves many new features and has been an exceptionally interesting automotive problem, principally because the 1000-horsepower engine required the development of special types of transmissions.

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"Masonry" Drills Increase Production

■ Production runs of cast brass pipe fittings, gas cocks, steam fittings, water gages, oil and grease cups in the plant of Consolidated Brass Co., 339 South Summit avenue, Detroit, formerly around 22 pieces, now often reach 20,000 or more before tool regrinding is necessary. This is due to the adoption of standard forms of Carboloy tungsten carbide tool bits and the development of new types of tool holders.

When drilling, the company uses a low-cost "masonry" drill built into the holders along with up to six standard tool bits. The performance of the "masonry" drills is considered remarkable by production men of the company, and it is in the use of these drills that the greatest increase in production between grinds is being obtained.

Defense Contracts

(*Concluded from Page* 52)

ers, $126,470.90.

Goodrich, B. F., Co., Akron, O., threaded rivets, $56,802.

Hayes Industries Inc., Jackson, Mich., wheel assemblies, $83,758.30.

Holley Carburetor Co., Detroit, carburetors, $90,682.08.

Ideal Electric & Mfg. Co., Mansfield, O., primary, nonautomatic additional cubicles, $50,147.

Jack & Heintz Inc., Cleveland, maintenance parts for starters, starter assemblies, $8,062,280.50.

Leece-Neville Co., Cleveland, generator, base, switch and regulator assemblies, $118,311.

Magnavox Co. Inc., Ft. Wayne, Ind., solenoid assemblies, $128,826.30.

Master Vibrator Co., Dayton, O., generating plants, $103,196.70.

Parker Appliance Co., Cleveland, tube benders, and flaring tools, $74,391.79.

Peck, Stow & Wilcox Co., Southington, Conn., brakes and folders, holders and shears, $95,531.40.

Pump Engineering Service Corp., Cleveland, pump assemblies with valve, $137,900.

Seifreat-Elstad Machinery Co., Dayton, O., formers, machines and shears, $95,114.

Sharpsville Steel Fabricators Inc., Sharpsville, Pa., tanks, $418,400.

Standard Steel Works, North Kansas City, Mo., stand assemblies, $459,000.

Staynew Filter Corp., Rochester, N. Y., carburetor air intake filters, $96,774.80.

United Aircraft Products Inc., Dayton, O., bearing and rod end assemblies, $69,344.

Vultee Aircraft Inc., Downey, Calif., adapter assemblies, $292,460.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., oxygen flow indicators, $85,733.10.

Wright Aeronautical Corp., Paterson, N. J., tools, $145,965.75.

Quartermaster Corps Awards

Autocar Co., Ardmore, Pa., tractor-trucks, $59,007.

Equitable Equipment Co. Inc., New Orleans, steel tugs, $518,000.

General Motors Corp., Chevrolet Division, Detroit, ½-ton trucks and chassis, $36,428.51.

Haggard & Marcusson Co., Chicago, folding steel cots, $332,950.

Mentzinger's, C. F., Sons Inc., Brooklyn, N. Y., plumbing system, dental clinic and infirmary, Ft. Jay, New York, $4606.

O'Brien, Thomas E., Co. Inc., Brooklyn, N. Y., heating system, dental clinic and infirmary, Ft. Jay, New York, $2292.

Prentice, G. E., Mfg. Co., New Britain, Conn., web strap buckles, $29,400.

Rex Products Corp., New Rochelle, N. Y., end clips, $5363.10.

Sanitary Refrigerator Co., Fond du Lac, Wis., folding steel cots, $165,000.

Shott Mfg. Co., Cincinnati, folding steel cots, $132,000.

Shuptrine Construction Co., Hattiesburg, Miss., fencing for critical areas, Camp Shelby, Mississippi, $15,150.

Smith & Davis Mfg. Co., St. Louis, folding steel cots, $168,000.

Winter-Weiss Co., Denver, semitrailers, $87,882.03.

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■ Water Treatment Co. of America, 1159 Hodgkiss street, Pittsburgh, is offering a unique "desk-top test" which demonstrates the ability of its product, Baerite, to disintegrate rust or scale. The test, according to the company, shows actually what takes place inside a big boiler or condenser and shows how the product functions in the treatment of industrial and commercial water supplies of all kinds. It is offered to anyone interested in the operation of steam or water-using equipment.

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Arc Welding

(Concluded from Page 88)

exist at a single point or points or may extend throughout the entire joint. It is obvious that in any case this matter of fitup is primarily a matter of preparation of the parts to meet the accepted or required dimensions. Any additional separation must be filled in with weld metal and is, therefore, wasteful.

The cost per pound of deposited metal for a ⅛-inch electrode is about $2.50 per pound and for ⅜-inch about 50 cents per pound. It should be noted that in general the difference in cost represents largely a difference in labor costs, which in turn means production speeds.

Another item involved in this matter of poor fitup is that it may necessitate the use of a different type of electrode than would normally be employed. For instance, an electrode which would deposit a rather convex type of bead may be required because of poor fitup and the permissible size of this electrode may not be as large as would ordinarily be used. Consequently this, too, reduces production and increases costs.

There is also, of course, the matter of fitup and performance of the welded part, an especially important factor in the fitting together of certain types of machine parts. Other types of fabrications such as certain structural parts may not necessarily require as accurate a fitup for satisfactory performance of the weldment. But insofar as cost is concerned, accurate fitup is always a MUST.

Reference to some of the preceding examples will indicate that in the case of a ¼-inch double fillet joint, it is economically worth while to spend approximately 25 cents per foot to obtain proper fitup. And such fitup is easily obtainable with modern production equipment. Thus it becomes a matter of figuring the footage, the total costs, and the number of hours. Then this translated into the savings of hours and dollars per year to see whether or not this will permit the purchase of additional equipment which will bring joint fitup accuracy in line.

As another example of how this works, consider a ½-inch plate 5 feet square. It costs approximately $2.50 for cutting to a tolerance of 1/64-inch or perhaps slightly more, but not greater than 1/32-inch. This is about 12.5 cents per foot of cut. Mill tolerances are of the order of plus or minus ⅜-inch, generally more. This necessitates the cutting of additional material and the consequent waste. Assuming that the plate is ⅜-inch oversize, then there is a piece ⅜-inch by ½-inch by 1 foot long which is scrapped. The scrap, at about 1 cent per foot, added to the 12½ cents, is cost of obtaining good fitup. If good fitup means an increased accuracy of only 1/16-inch, then the good fitup is preferable as the 1/16-inch means an increased cost of about 25 cents per foot.

The matter of fitup—that is, getting accurately cut parts—is thus a profitable investment. A brief inspection of the cost per pound for the material and the cost to remove the material and to make accurate line-up will indicate that in practically every case it is possible to obtain a cost reduction by specifying accurate fitup of parts.

NIHIL SUB SOLE NOVI

More than two thousand years ago a wise old preacher said "Nihil sub sole novi" . . . . meaning there is nothing new under the sun. While there is nothing new, there is much to learn: and in the matter of bearings and bearing metals, even we who are in the business are always learning something new about it. We have prepared two booklets concerning Babbitt's invention, the research work of the late A. W. Cadman, the heating effect in bearings, the theory of lubrication, types of bearing metals, etc. These booklets were printed for private distribution to those who are interested. You may get your copies by writing for them.

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Booklet on Preservation Of Business Records

■ Business Historical Society Inc., Soldiers Field, Boston, has issued its fourth edition, *Preservation of Business Records,* which is available free to all interested.

This was issued first in 1937 and reprinted twice, being out of print since the third printing late in 1940. It is designed to aid in preservation of vital records by any institution. It tells why such records would be preserved, what materials should be selected.

Manual of Wage-Hour Laws and Regulations

■ *Wage and Hour Manual*, 1941, cloth, 1120 pages, 6 x 9 inches; published by Bureau of National Affairs Inc., 2201 M street N. W., Washington, for $5.

This is a manual of wage and hour legislation. It contains all documentary material on government regulation of hours and wages, laws, administrative regulations and interpretations and court decisions. The documents are fully indexed and interspersed with nontechnical explanatory articles.

Supplementing the basic material are some 300 authoritative answers to questions on the law's application to specific cases. It also contains a compilation of all court decisions under the law to March, 1941. Some 120 opinions are presented in text or digest. A topical index and table of cases extends to 50 pages.

The first of three parts contains 17 chapters on overtime, minimum wage and other provisions of the Fair Labor Standards Act. Part II covers the Walsh-Healey Public Contracts Act and other laws on wages and hours and Part III is devoted to state legislation on the same subjects.

Canada Rations Steel Distribution

(*Concluded from Page* 53)

Aircraft Co. Ltd., Longueuil, Que., $871,876; Federal Aircraft Ltd., Montreal, $108,000; Noorduyn Aviation Ltd., Montreal, $631,800; Laurentian Metal Products Ltd., Aylmer, Que., $5664; Ottawa Car & Aircraft Ltd., Ottawa, $18,590; Ling Mfg. Co. Ltd., Gananoque, Ont., $107,724; Peterborough Canoe Co., Peterborough, Ont., $22,957; Horton Steel Works, Toronto, $8330; Premier Mfg. Co. Ltd., Toronto, $5119; National Steel Car Corp. Ltd., Malton, Ont., $140,400; Thompson Products Ltd., St. Catharines, Ont., $114,564; MacDonald Bros. Aircraft Ltd., Winnipeg, Man., $32,535; Standard Machine Works Ltd., Winnipeg, $13,787.

Ordnance: Canadian General Electric Co. Ltd., Toronto, $22,335; Shiff & Co., Montreal, $5760; Otis Fensom Elevator Co. Ltd., Hamilton, $7,013,835; Hill-Clark-Francis Ltd., New Liskeard, Ont., $20,270; Ford Motor Co. of Canada Ltd., Windsor, $534,344.

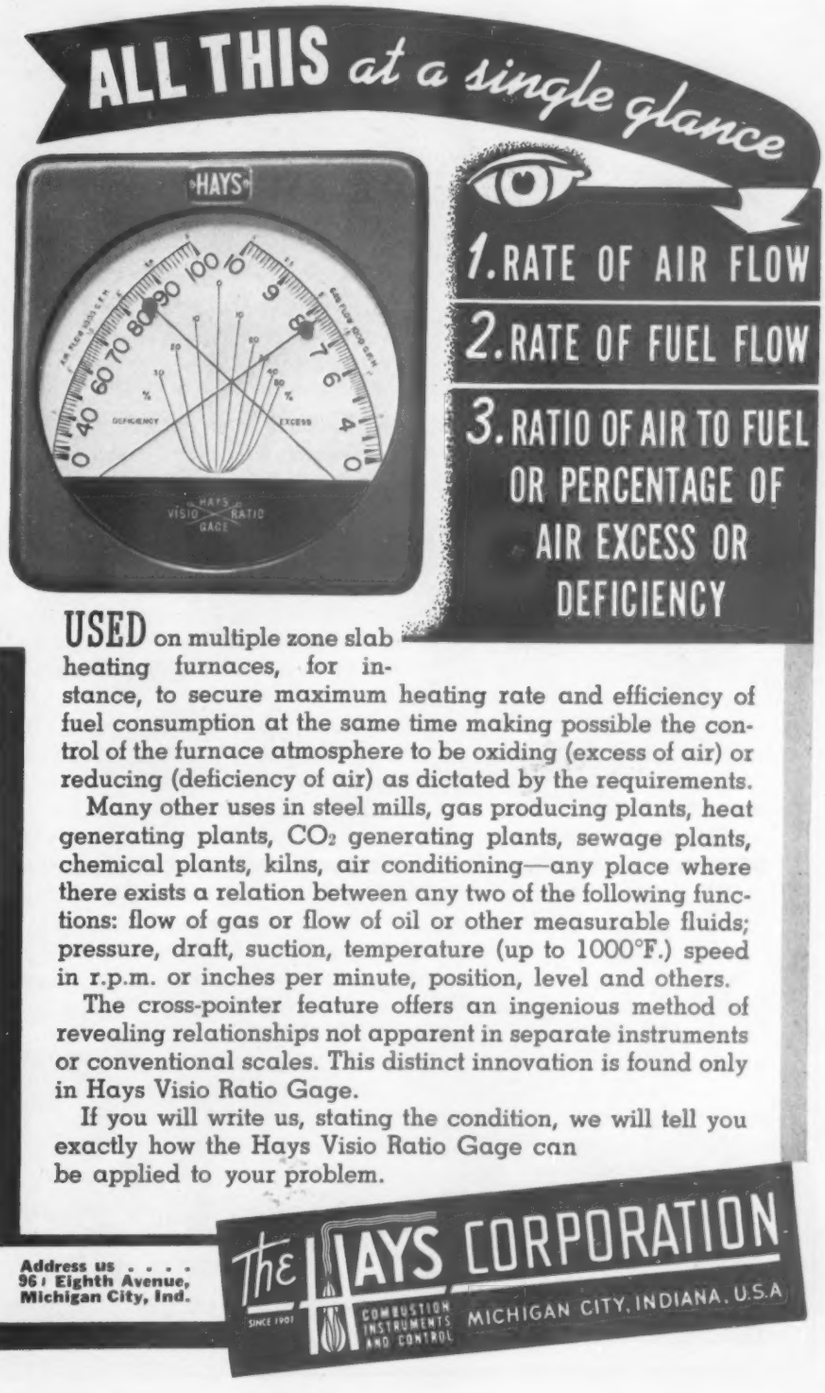
Munitions: McKinnon Steel Co. Ltd., Sherbrooke, Que., $15,950; Northern Electric Co. Ltd., Montreal, $722,271; Canadian Acme Screw & Gear Ltd., Toronto, $18,462; Flaherty Mfg. Co. Ltd., Hamilton, $16,057; Pressure Castings of Canada Ltd., Weston, Ont., $12,129.

Travelling crane: Richards-Wilcox Canadian Co. Ltd., London, Ont., $13,000.

War construction projects: Redfern Construction Co., Toronto, $317,000; Angus Robertson Ltd., Montreal, $1,000,000; Hill-Clark-Francis Ltd., New Liskeard, $372,506; Shoquist Construction Co., Saskatoon, Sask., $520,000; Stewart Construction Co. Ltd., Sherbrooke, $110,000; P. W. Graham & Sons Ltd., Moose Jaw, Sask., $500,000; W. C. Wells, Wilkie, Sask., $490,000; Smith Bros. & Wilson Ltd., Regina, Sask., $510,000; Newton Construction Co. Ltd., Sherbrooke, $420,000; Bennett & White Ltd., Edmonton, Alta., $120,000; Collet Freres Ltd., Montreal, $1,019,000; George W. Porter Construction Co., Toronto, $114,000; Tomlinson Construction Co. Ltd., Toronto, $80,000; Bird Construction Co. Winnipeg, $1,177,000; New Brunswick Contractors, Fredericton, N. B., $118,415; McLaughlin Bros., Ottawa, $95,500; Clayton Co. Ltd., Winnipeg, $91,784; Bennett & White Construction Co. Ltd., Calgary, Alta., $834,465; Maxwell Construction Co., Vancouver, $83,707; General Construction Co. Ltd., Vancouver, $84,152.

Structural steel: Sarnia Bridge Co. Ltd., Sarnia, Ont., $151,190; Dominion Bridge Co. Ltd., Lachine, Que., $2,912,864.

Miscellaneous: Horton Steel Works, Toronto, $41,620; Toronto Iron Works, Toronto, $45,369; Canadian Comstock Co. Ltd., Toronto, $73,700; Frost Steel & Wire Co. Ltd., Hamilton, $8595; Waterman, Waterbury Ltd., Regina, $6675; Standard Iron Works Ltd., Edmonton, $8579; Gillette Safety Razor Co., Montreal, $18,500; Viceroy Mfg. Co. Ltd., Toronto, $45,323; Kormath Mfg. Co., Toronto, $7793; George C. Abbott Ltd., Toronto, $35,000; W. R. Menzies & Co., Victoria, B. C., $110,000; Reid & Cambridge Ltd., Westmount, Que., $8000; Partridge-Halliday Ltd., Winnipeg, $44,000; Thomas O'Connell Ltd., Montreal, $140,000; Anthes Foundry Ltd., Winnipeg, $21,000; Bennett & White Construction Co. Ltd., Calgary, $30,000; H. Kelly & Co. Ltd., Edmonton, $6000; Worcester Fire Extinguisher Co., Montreal, $20,000; Dutton Bros. & Co., and Assiniboia Engineering Co., Winnipeg, $49,000; W. G. Edge Ltd., Ottawa, $18,000.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Carbon and Graphite

(*Continued from Page* 68)

them joinable for continuous use.

Graphite articles follow the described process through the cleaning, and then go to the graphitizing furnaces. There they are packed and covered with coke so that the mass having a predetermined resistance fills the spaces between two large terminal electrodes. The switch is thrown and gradually the mass heats up, due to its resistance, until at a temperature of 2200 degrees Cent. (3992 degrees Fahr.) the amorphous carbon starts to change to graphitic. To make certain that all of the material is completely changed to graphite, the temperature is carried up to 2700 to 3000 degrees Cent. (4892 to 5432 degrees Fahr.). Slow cooling follows, then the cleaning and threading, if that is required.

Graphite as described should not be confused with the so-called graphite crucible material which is dissimilar, for it is made from natural flake graphite and clay mixed, formed, and baked. Each type of material has its uses which overlap to a slight extent.

The carbon industry has been successful in expanding the use of carbon and electric furnace graphite to many new applications, not only in the ferrous and nonferrous industries as molds, mold plugs, stools etc., but in the chemical industry as well.

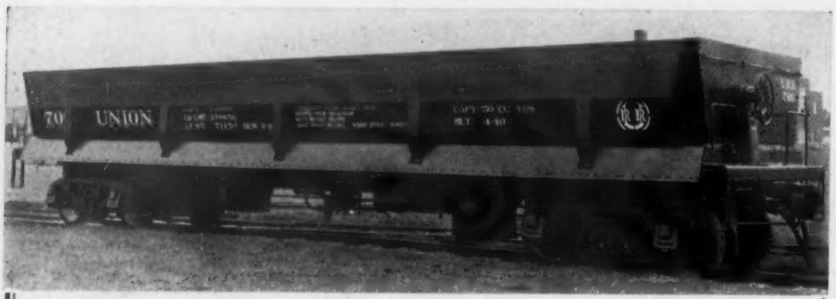
Carbon and electric furnace graphite possess many useful properties for service in the metalworking industry. These materials retain their mechanical strength throughout a wide variation in temperature up to 2000 degrees Cent. (3632 degrees Fahr.) Hot metals will not stick, thus making stripping or cleaning operations relatively easy and inexpensive. Carbon, where used, will permit slow cooling while graphite results in rapid cooling. The difference in thermal conductivity of the two materials makes it necessary that service problems be studied carefully before purchasing material for use, bearing in mind that they can be machined into most intricate shapes if necessary. The large shapes and sizes mentioned in the opening paragraph present a particular advantage which saves on installation cost. It is unnecessary to coat carbon or graphite molds; if replacements are necessary they can be made at relatively low cost.

Uses Molds and Mold Plugs

Aside from furnace lining applications, the steel industry has been using carbon mold plugs, purchasing in varying quantities up to car lots. Carbon and graphite molds also are being used. At first they were used solely on the more expensive metals, but in recent years the application has spread more widely to include molds for such sizes as 10 x 10 x 30 inches (inside dimensions). By proper design the molds are of such a size that the heat of the metal is absorbed without causing sufficient temperature rise in the mold to permit oxidation of the mold. The ingots strip clean with especially smooth surfaces and the molds can be used indefinitely.

Carbon bricks are being used as trough linings in blast furnaces with a surprising degree of success. The exposed surfaces are protected by a thin film of hot metal that, when the flow of metal is stopped and water applied or cooled by natural means, the cooled metal cracks and falls to the bottom of trough. There is no need for the application of a crowbar to clean the trough of solidified metal.

Carbon and graphite stool inserts are being tried at present and appear to be entirely practical. This material, being able to resist the action of the hot metal, should give reasonably long life as an insert, making it possible to replace the insert at a nominal cost, and would



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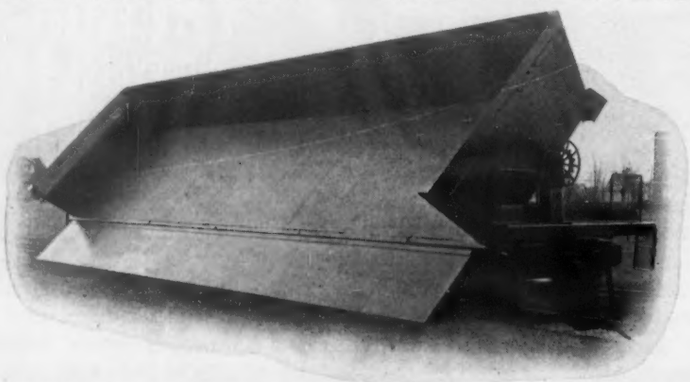

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make it possible to get greater life out of the cast-iron stools. Carbon in the base of the mold reduces stripping difficulties to a minimum.

It is probable that there is an application for carbon brick as a lining material for iron ladles at the blast furnace. In the lower half and the bottom, carbon might be used to advantage and prove reasonably economical in spite of higher cost. The cutting out of the carbon brick by the stream of metal would be less than for clay brick, and what cutting might take place would not end up in the metal as slag inclusions. Then too, the metal and slag would not cling to the carbon brick as to the fire brick resulting in simpler maintenance.

If the soda ash method of sulphur control becomes a factor in the iron industry, carbon and graphite linings for the ladles should be particularly valuable.

One application in which the blast furnace operators should be interested is the application of carbon as a lining material for the hearth and bosh up to the mantle.

The practice has been standard in Germany for many years, having been started in the early eighties. The physical properties of carbon make it ideally suited for this application.

Widely Used in Europe

German authorities claim 75 per cent of their blast furnaces as of 1937-38 were carbon lined and 85 per cent of their iron is made in carbon lined furnaces. The practice has spread to Belgium, Sweden, Italy and Russia. Where it was claimed that 1,500,000 to 2,000,000 tons would be secured from a carbon lining, figures not unusual in the United States, now under the pressure of war they have reported several furnaces approaching 3,000,000 tons with at least one exceeding this campaign.[1]

Cooling plates are not required where carbon lining is used, and the cost of the plates is about 40 per cent of the cost of the lining up to the mantle. The Germans provide outside cooling of the shell, since only that part need be cooled —not the carbon lining—but there is evidence that with a carbon lining the shell should remain cool enough without external cooling.[2]

Carbon blocks can be installed in large sections up to 6000 pounds per section. This is a large piece, particularly when considering that carbon weighs approximately 96 pounds per cubic foot. The large sections should prove to be handy in the hearth and smaller sections on the sidewalls with machined carbon blocks around the tuyeres.

Steel plant operators more and more are operating chemical plants as part of their regular equipment and with the disposal of pickling liquor becoming an increasing problem, their contact with chemical industry increases. In many plants precipitators are now operated and there is some indication that, while carbon tubes may not be necessary, still, carbon sleeves at essential places to protect the metal tubes, might prolong their life and reduce maintenance costs.

An early application of carbon is the use of carbon brick in pickling acid tanks, particularly those used in the pickling of stainless steel. The first application of carbon brick to the lining of a pickling tank for stainless steel was in 1932, but since that time the use has so increased that it is safe to say that most steel of that type, as well as much of the more usual grades, is treated in carbon-lined tanks.

The carbon linings are used as protection in steel, wood and concrete tanks. In some cases the bricks protect rubber linings over steel, in others the carbon is backed up by asphalt impregnated paper or felt. In all cases the desirable characteristics of carbon, resistance to chemical attack, resistance to thermal shock, low coefficient of expansion, poor trans-

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mission of heat, good strength and resistance to abrasion, make carbon brick linings valuable regardless of the size of tank.

Cottrell precipitators of phosphoric and sulphuric acid have been constructed of carbon, that is the sidewalls as well as the tubes.

The early carbon towers were built from standard carbon blocks usually 8 x 8 inches or 10 x 10 inches and about 120 inches long. This construction was more or less satisfactory, but in 1940 a carbon tower was designed and built that took full advantage of the workability of carbon. Fig. 1 shows the construction of the upper part of the tower which was 14 x 14 x 27 feet. The floor plates are 6 x 28½ inches x 14 feet long; the sidewall blocks are 12 x 28½ inches x 15 up to 18 feet long. It will be noticed that all points are keyed as well as cemented.

Fig. 1 shows a real step in the progress of the carbon as a material of construction, for the narrow beams shown which eventually support the carbon tubes are but 4 inches wide, 28½ inches deep and 14 feet long, diamond sawed from a carbon block 24 x 30 x 180 inches. Each carbon block is dead weight tested before shipment at twice the maximum expected load. These carbon beams are used to replace a rather costly arch formerly constructed by using chemical brick and specially prepared acidproof cement. It should be remarked that the roof is constructed of carbon slabs and the vent is 17 feet tall constructed of carbon pipe sections 33 inches diameter. The cost of laying up the relatively few carbon blocks is decidedly less than for the thousands of brick used for this purpose. Carbon construction for this application will last indefinitely and require no maintenance.

Suitable for Liquids

Carbon is usually porous and unless specially treated, cannot be used for handling liquids except with some seepage, which may not always prevent the use of the untreated material. However, with the introduction of "Karbate"[3] materials, Karbate No. 1 impervious carbon and Karbate No. 2 impervious graphite, even that difficulty has been overcome.

Karbate No. 2 is an unusual material, having all but one of the good qualities of graphite (its use is not advised at temperatures over 170 degrees Cent. or 338 degrees Fahr.) plus the fact that it is impervious. One of the fields where it has found wide application is in heat exchangers in highly corrosive conditions, either as the tubes in simple exchangers and heaters or as the tube bundle in tube and shell exchangers of many sorts. The overall heat transfer factor of the No. 2 material is slightly higher than for iron or steel pipe and definitely higher than those of the usual materials resisting corrosion.

Steam heaters using Karbate tubes are particularly desirable, if a hydrochloric acid pickle is used, for acid has no effect on this material. The same is true of sulphuric acid.

Another interesting quality of this grade of tubes is that the material inhibits fungi growth, and when it does appear, it does not stick to Karbate pipe the way it does to most metals. As a result there is an application in any cooling device using contaminated river or slip water, as for example, cooling the ammoniacal liquor from coke oven gas. Eventually steel plants using contaminated river water for many cooling jobs probably will find it advisable to build the equipment of Karbate materials to prevent the corrosion they now encounter.

Gas-fired pickling tank heaters in which the gas is burned within the heaters and the heating is done by the products of combustion passing through the Karbate tube, have high efficiency and are being accepted by the industry.

Coil heaters using steam are

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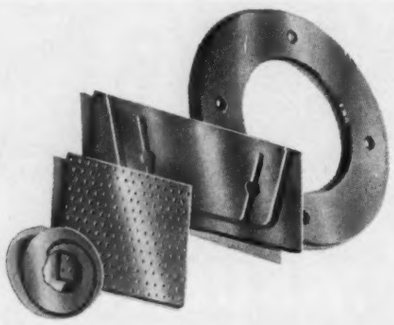

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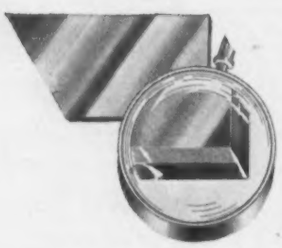

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fabricated in all sorts of shapes and capacities to meet the conditions. Since Karbate materials can be machined about as easily as brass, for example, the tubes and fittings may be threaded or flanged or cemented together to secure the necessary results. Fig. 3 shows an example of the sort of simple heaters designed for heating tanks containing highly corrosive liquids.

Centrifugal pumps made entirely of this material have been designed and several have been installed experimentally with every indication that a full line of pumps will be available soon. They are ideally suited for handling the various corrosive pickle liquors.

Another interesting application of the material is as hold-down rolls in a continuous alternating-current pickling machine. The rolls are 18 inches diameter and 35 inches long, with separate carbon hubs. No other material has proved satisfactory.

Used As Grounding Medium

It hardly seems reasonable to suggest the use of carbon ground rods in a steel plant since presumably scrap iron is too cheap to make the application of carbon economical, but other industries are finding carbon much more satisfactory on every count. Underground corrosion of pipes, tanks, foundations, etc., in steel plants is a problem because so many mills are built on filled ground composed of cinders, ashes and other wastes.

Carbon brick plates and blocks are an ideal material for use in fly ash removal when powder coal is fired and for lining cinder catchers. Carbon lasts indefinitely in such applications since it is not attacked by either the sulphuric or sulphurous acids usually found in such equipment, as is cast iron, nor is carbon shattered by heat shock as so often happens when ceramic plates are used. In one installation for fly ash removal, after three years of service, the machine tool marks on the carbon part of the equipment were still visible, indicating complete resistance to attack.

Although all carbon is porous to a greater or less extent, Carbocell[2] porous carbon and Graphicell[3] porous graphite have controlled porosity or approximately double that of the usual grades, about 48 per cent, and the permeability can be varied over a wide range. These materials have all the usual good qualities of carbon and are being used for diffusion of gases in liquid, for aeration and filtration of corrosive liquids. They make an ideal material for use as steam spargers, for heating pickling tank liquids, inasmuch as the steam is dissipated in minute bubbles so that in passing upward through the liquid practically all of its heat is absorbed. Also, being so thoroughly diffused there is no pounding such as occurs when a drilled pipe is used.

[1] See *Iron and Steel Engineer*, April, 1940.
[2] See *Proceedings*, American Institute of Mining and Metallurgical Engineers, Sept., 1940.
[3] Trade-mark of National Carbon Co., Inc.

Develops Lightweight Insulating Refractory

■ A lightweight insulating castable refractory, Plicast L-W-I, recommended for service temperatures as high as 2200 degrees Fahr., is reported by Plibrico Jointless Firebrick Co., 1800 Kingsbury street, Chicago. It is said to be especially suitable for lining heat-treating, annealing, stress-relieving, carburizing, and other types of industrial furnaces.

The material has low heat storage capacity, thus heating and cooling rapidly. Its light weight is an advantage in various types of furnace construction where it is desirable to reduce the weight and cost of the steel work employed to support the furnace walls. The material also occupies less space.

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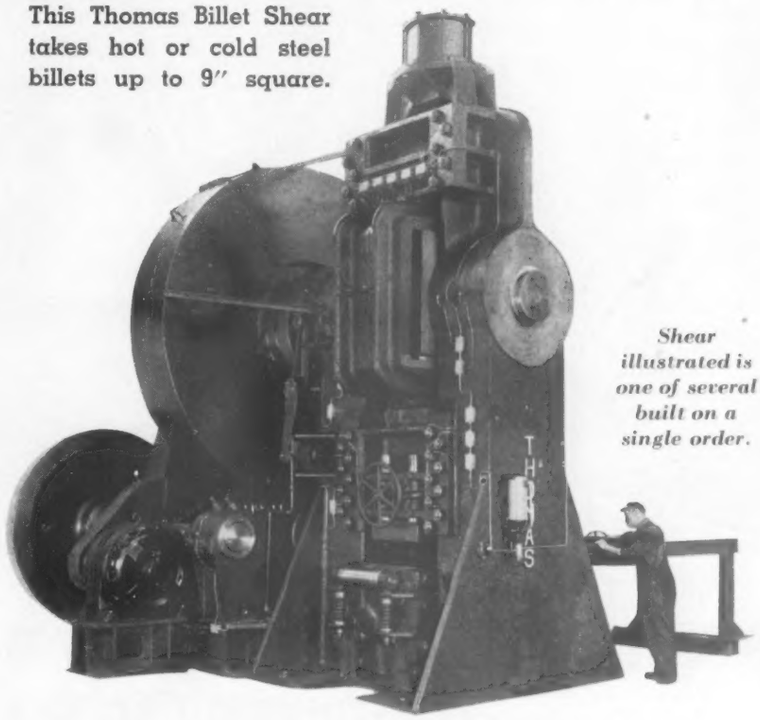

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Warplane Plant

(*Concluded from Page* 80)

the propeller hub as well as a number of heavy automatic machine guns.

Most of the preliminary fabrication is still centered at the Buffalo plant, parts being delivered to the new assembly plant by the company's own highway trucks and trailers. Parts then are transferred directly from the truck to subassembly stock cribs alongside each department or direct to the final assembly station where they are to be used. Some of these bins can be seen in accompanying Figs. 3 and 4.

The four main assembly lines extend side by side from east to west through the center of the plant in the main bay. See Fig. 1. A 30-foot ceiling clearance is had here, most monitor bays on either side of the main bay. Here a 20-foot clearance of the subassembly work being concentrated in the four lower 50-foot to roof trusses is available.

Diagram Fig. 2 shows clearly the arrangement of the various lines. There are 14 main assembly stations along each of the four final assembly lines, with the various subassembly lines feeding into the main assembly as shown in the diagram. Each complete subassembly reaches the final assembly floor already painted on its own specially designed dolly. The various plane elements may ultimately be delivered to their respective stations on the main lines from the subassembly departments by overhead conveyor when peak production is reached.

At present, the front fuselage sections swing into the conveyor production line on individual dollies at the east end of the plant (at the right in Fig. 2). At station No. 5, engines are installed. The dollies on which the front fuselage sections are fed into the line also serve as final assembly jigs. They are moved westward down the assembly line by drag chain conveyors set flush in the floor and clearly visible in Fig. 4. Each dolly contains a number of air and electric power outlets. These outlets on the dolly are connected into underfloor service ducts available every 15 feet down the assembly lines. More than 300 such outlet boxes stretch across the entire floor area, spaced on 25-foot centers throughout the remainder of the plant. Additional outlets are provided on columns and at certain overhead points.

Plane Slowly Takes Form

Dollies are attached to the drag chain conveyor by means of a hand hook as shown at the lower center in Fig. 4. The floor chain moves at varying rates, and as the plant reaches peak production, speed will be increased from the present tempo.

From the layout diagram Fig. 2, it is seen that the front fuselages are fed into the start of the final assembly line at the extreme east end of the plant. Then at succeeding stations, engines are installed, cabins are fed into the line through an overhead monorail and finally the wing assembly added. In each of the subassembly departments, cranes and monorail facilities speed movement of parts and subassemblies. Spray booths are designed into each of the subassembly lines to meet the specific requirements of each unit. This eliminates a separate routing to handle the painting operation.

But going back to examine the assembly system in more detail, we see that after rear fuselage sections are placed, additional operations on the final assembly line include installation of armor plate; guns with their feeds and controls; propellers and the like. Meanwhile, the wings are taking shape in the several departments which completely fill the north bay of the plant. The wings are rolled on dollies out into the unobstructed 200-foot-square hangar area at the west end of the plant and there are

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attached to the completed fuselages. Interlocking cranes which span the 200 feet in the final assembly bays fulfill all overhead handling functions in this area.

Generous areas of sash in sidewalls, monitors and skylights above the center bay provide excellent daylight. A new type of electrified fluorescent luminaire, specially developed by General Electric Co. for high-bay illumination, is used here for the first time. These units are installed at 720 positions down the center of the plant on 12-foot centers to produce a minimum of 30 footcandles illumination on the working plane. A special circuit in these units rectifies alternating current so that direct current passes through the tubes themselves. This has the effect of smoothing out the current wave and eliminates stroboscopic effect without any special balancing. Thus efficient night operation is assured with ample, glareless, high-quality illumination flooding the assembly areas.

2000 Tons of Steel Used

Comparable lighting intensity is provided for subassembly work in the two 50-foot bays on either side of the final assembly area. Designed and built by the Austin Co., Cleveland, the plant required 2000 tons of structural steel including eight 200-foot trusses weighing 38 tons each and a 45-ton truss to support four 50-foot overhead canopy-type doors which provide a 200-foot opening 30 feet high through which planes move off the production line onto the apron. See Fig. 2.

While main offices of the plant at the present are located at Buffalo, the Niagara Falls plant includes offices for accounting, time keeping, inspection, production and engineering departments as well as facilities for the aerodynamics staff and officers of the army, a radio control room, and pilots' lounge.

Roof of building is 2½ inches of reinforced gypsum, poured in place over 1-inch insulating board which rests on 15-pound rails welded to the steel purlins. A 5-inch reinforced concrete floor slab is finished with a metallic hardener worked into the wearing surface.

A 200-foot firing range with special ammunition storage and gun mounting facilities is provided in an adjoining building facing a target butt 20 feet high and about 100 feet wide built up from two carloads of 8 x 8-inch timbers used for cribbing to hold an earth fill. Other facilities include parking area for almost 2000 cars and a boiler house with two 300-horsepower oil-fired boilers. Sprinklers installed throughout the plant are supplemented in the hangar area by a deluge curtain, consisting of metal baffles within the trusses around this area. Here special sprinkler heads provide a sheet of falling water sufficient to isolate any blaze.

Replaces Aluminum Foil With Composition Metal

■ Complete substitution of nonessential composition metal for aluminum foil is announced by the Display & Container Division, Reynolds Metals Co., Richmond, Va. Because of a foresighted research conducted by the company's laboratories before the present shortage of aluminum, the new substitute composition metal packages were ready for market as soon as demands of defense production took over available stocks of aluminum.

According to J. Louis Reynolds, general sales manager, these containers are finding ready acceptance in the food field. Gold and silver backgrounds for embossed and printed labels and packages predominate in early deliveries of the metal.

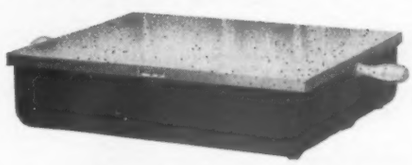
The containers are of a highly calendered paper board with foil on the outside, and with a clear plastic over a sized clay coating on the inside.

PRECISION EQUIPMENT FOR PRECISION WORK

CHALLENGE SEMI-STEEL LAPPING PLATE

For accurate lapping of joints required to hold oil, this Challenge Lapping Plate is highly recommended. It is specifically designed to assure a perfect fit when lapping metal-to-metal joints on which no sealer of any kind is used. Made of finest semi-steel, specially heat-treated and machined, this plate has 1/16" grooves, ½" apart, running the full length and width of the surface. The Challenge Lapping Plate is available with or without an all-steel, arc-welded stand, equipped with lock leveling screws to keep the plate absolutely level. Ask for sizes and prices.

CHALLENGE SEMI-STEEL SURFACE PLATE



Heavy, deep ribs on the under side form triangular supports for the top surface. Felt-lined wooden cover furnished with each plate.

Here is a true surface for tool making, inspection, and testing purposes. Built to retain an accurate plane surface; will not sag. Made of strong, close-grained semi-steel, specially treated to overcome strains in casting and machining and to avoid distortion after scraping. Nine sizes.

THE CHALLENGE MACHINERY COMPANY
GRAND HAVEN, MICH.

FREE CATALOG—Illustrates and describes Challenge Time- and Labor-Saving Devices for Tool and Machine Industries.

Name_____

Full Address_____

Speed Your Production

(*Continued from Page 62*)

for the safe and speedy lifting and transporting of heavy wire coils.

The management of a metal furniture factory was purchasing power under a contract that imposed a penalty for power factor operation below 95.6 per cent. Hence, for the privilege of operating the plant at 64.7 per cent power factor, they were paying plenty. Two principal factors were to blame. Second-hand transformers of doubtful electrical efficiency were used for welding. Other transformers and circuits were badly balanced. A new transformer especially adapted to the welding requirements was substituted and minor changes made in the other circuits. Result was better load distribution, good balance, high efficiency and power factor increased to 91.7. The saving in power factor alone will run around $6500 yearly.

Even with welding operations of large and important metalworking plants, controls for welding operations are very inadequate in many plants. Big reductions in welding costs, often exceeding 60 per cent, with stronger, sounder, more ductile welds resulted from the installation of proper controls, it was found. Rejects were practically eliminated. In three plants, automatic controls that timed the welding cycle at four intervals were installed. Ordinary air-operated welding machines were being used and the addition of this timing control transformed them into high-speed efficient tools for a much wider range of welding operations.

Modern contactors installed in a number of plants cut time-outs to minimum. In these days, when every minute counts, it is surprising what a few little automatic gadgets can do in the way of keeping production moving steadily—and speedily.

Production Speeded 20 Per Cent

We checked the performance chart of a machine driven by two 85-horsepower motors operated in series. When an old contactor was on the job, contacts were changed every 24 to 48 hours, depending upon the frequency of operation, and arc shields were replaced weekly. A new contactor replaced the obsolete unit after which contacts were changed every seven weeks—a real improvement.

In another mill, an old contactor rated at 1000 amperes, continuous capacity, could not meet the more exacting demands brought about by a speed-up program on severe butt-welding operations. Contacts often stuck two or three times daily, causing costly delays and renewal of contacts every third week. In August, 1940, a modern contactor replaced the obsolete and the records showed that, after 9 months of continuous operation, making 28 operations per minute, 24 hours per day, 7 days a week, this contactor is still operating satisfactorily with the original contacts and arc shields.

Seventeen plants replaced obsolete motor controls which had been holding down production to a molasses pace because of burned contacts, broken jumpers, sluggish contactors, gummy or corroded bearings. Modern units, simpler in construction with fewer parts and less likely to get out of order, speeded up production 20 per cent for a comparatively modest investment.

Three maintenance men reported considerable trouble with boiler pressure until they installed automatic combustion controls which synchronize fuel feed and draft adjustment to meet the various process steam demands, thus maintaining continuously uniform boiler pressure. Before this installation was made, steam lines were continually cutting in and out, disrupting production.

Pyrometers for measuring stack temperatures are vital factors in

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Produced in our modernly equipped foundry from electric furnace steel and heat-treated in automatically controlled gas-fired furnaces.
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DAMASCUS STEEL CASTING CO.
New Brighton, Pa.
(Pittsburgh District)

maintaining overall production efficiency in steel mills, and we were told of 12 recent installations, replacements and originals.

Terminal voltage is below normal in many plants, and that means poor power factor, which is costly. A metal box plant cut its line voltage drop with capacitors. The original power factor of 66.1 per cent was corrected to 97.1 per cent, resulting in average monthly savings of $70 credited to power factor alone—and the equipment cost only $600.

Complete automatic control of plant processes is the modern trend and a sure way to obtain maximum output. One saw manufacturer turning out a high quality product is typical. The steel used is produced in electric melting furnaces, one a 3-ton 1500-kilowatt unit, the other a 6-ton 2500-kilowatt furnace. After ingots are poured, they are hammered under a 6-ton steam hammer, the heat being maintained by a pusher-type furnace. To roll the steel, large direct-current motors receive power from motor-generator sets. From the pouring of the special steel to the precision grinding of gullet and tooth profile on saws, production is under complete automatic control.

Plant Capacity Increased

The mill is started by the operator—first motor generator, then the mill motor—through push-button controls located near the operator's station. The room housing these motors and controls is kept under lock and key and opened only for inspection by the maintenance department. This manufacturer reported that the plant is having no difficulty meeting almost peak capacity demands, that if his plant lacked complete control facilities, they could not hope to attain the present output because before the plant went all-out for automatic control, they were hard put to exceed 70 per cent of capacity. Now they are making 85 per cent easily.

We found considerable evidence that control equipment was giving trouble because of lack of proper maintenance. Among the main defects were loose terminals, contacts badly aligned making poor contact with improper pressure, worn parts, loose shunt connections, dirty parts and enclosing cases, control not kept dry, fuses oversize, molded material burned away from arc shields, wire and cable badly insulated and not of ample capacity.

Safest procedure is to check contactor tips weekly, we were told. Some maintenance men file these tips whenever they are rough but we were informed that mere roughness is not a sign of poor contact unless the tips are pitted. Tips should be filed only if the contactor is heating up. One maintenance man told us that it is not practicable to keep contact resistance low by filing, that a silver face can be brazed on the two tips so that contact is made through that metal. He also advised that most contactor coil trouble is due to overheating, that such difficulty can be minimized if the coils are wound for the voltage that actually exists on the line, especially if room temperature is high.

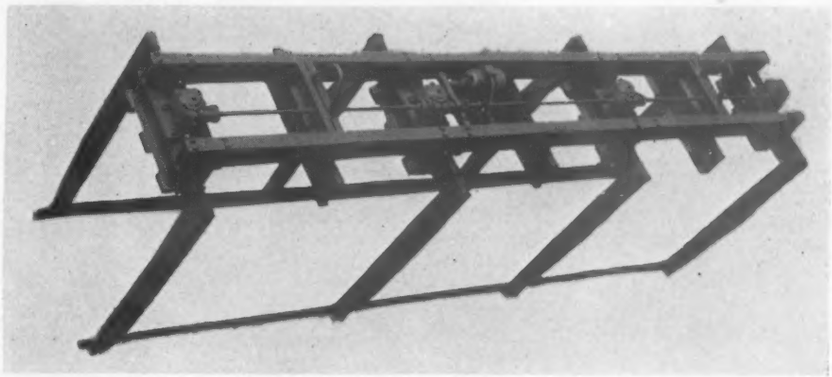
Where dashpot relays are used with motor controls, we found trouble because of tripping while the motor was starting or shortly after it had gotten up to speed. For the benefit of those who are experiencing similar trouble, we can advise that a heavier oil corrected the condition in some cases.

Twice on our travels we found that production had been interrupted because the motor controllers were expected to protect against short circuits. Remember that a motor controller is usually designed to handle normal operating conditions only. A circuit breaking device of proper capacity should be placed in the line ahead of every starter or group of starters.

There are many other sources of low output. For example, the motors in one plant were acting

MANSAVER GRABS

(PATENTED)



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J-B ENGINEERING SALES COMPANY

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up and installation of new motors was seriously contemplated. But an outside electrical engineer was called in and he found that the grades and dimensions of the brushes used were unsuitable. Often poor motor performance can be improved by installing better brushes.

In another case, the brushes were wearing fast and sparking. This was corrected by the simple expedient of tightening the stud nuts. In the same plant, excessive sparking was found caused by shrinkage of stud bushings.

Lubrication is another "Peck's Bad Boy"—because no one checks it periodically. You may effect tremendous increases in output by switching from a cheap oil to a better grade or from an unsuitable lubricant to one especially made for your work. For example, one plant, by merely switching to better cutting oil, increased the spindle speed on pipe-threading jobs from 60 to 80, or 33 per cent with thread quality the same. In another plant, speeds were increased 40 per cent in the screw machine department and tool life 75 per cent.

In 40 per cent of the plants visited, the managements were using or testing different oils for the purpose of speeding up production, indicating the attention that is being focused on lubricants as output boosters. Plants that are buying lubrication on price should change this practice NOW because the cost of a lubricant is a small factor in total operating cost.

Fundamentally, lubrication is a mechanical control and should be watched as carefully as processing and electrical controls. Over-lubrication, however, is as bad as under-lubrication. With everyone working at top speed today, maintenance men "give her the gun" unduly. To prevent this, some plants installed fittings to lubricate ball and roller bearings just right, also filtering and oiling systems to keep the oil clean. We saw four installations of automatic lubrication on power presses. These eliminated oiling time, lubricant waste and production delay and may help on many other equipment items.

There is general agreement that maintenance men must be on their toes today more than ever before. In many cases, the difficulty of getting new machines is forcing the use of old machines 24 hours a day, and they must be nursed along carefully to avoid breakdowns and stoppage of production. The maintenance department should keep plenty of supplies, spare parts and accessories on hand so no time may be lost waiting for materials to put a machine back in operation.

In one Pennsylvania plant we visited, a valve went bad and shut down an entire department for 7 hours because there were no spares on hand for a pressure-reducing valve.

Plastic packing is another excellent new maintenance item. One maintenance man pointed out that it saved time because it could be molded into place and there was no waste. Plastic metallic packing conforms easily to stuffing boxes, does not wear, score or pit and is effective on water, steam, air, gasoline and oil.

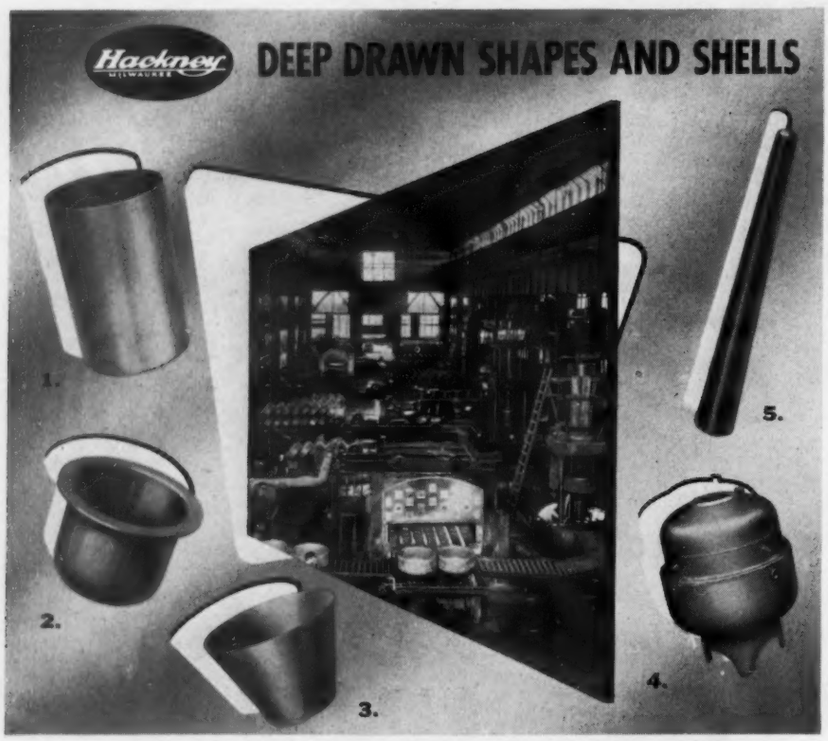
In general, the results reported through the use of proper modern controls and other auxiliaries as covered in these case histories may be summed up as follows:

They get more production out of existing machines.

They assure better co-ordination between machines, eliminating the costly "bottleneck" common in plants where mill schedules are geared to peak capacity. They improve quality, minimize rejects and time out for repairs, breakdowns, delays.

Column of Mercury May Control Motor Speeds

■ A column of mercury in a glass tube may become the basis of one



HACKNEY FACILITIES ARE USED TO SOLVE MANY MANUFACTURING PROBLEMS

● In hundreds of plants—in many industries—manufacturers are availing themselves of Hackney facilities. By using Hackney deep drawn shells, they have been able to increase the advantages of their product.

Pressed Steel Tank Company are specialists in the manufacture of seamless deep drawn shells and shapes of various sizes. Each shell is drawn from a solid circular sheet or plate of open hearth steel by means of high pressure hydraulic presses especially designed for this work. Hackney's Special Cold Drawing Process results in smooth finish, uniform thickness and temper. It assures elimination of laminations in the finished product.

Let Hackney engineers help you develop new shapes and shells or improve on those now being used. Many times production has been speeded up, and the cost of an individual part reduced. Frequently overall weight is lowered—at other times strength is increased—while often both results are obtained. Write today for full details.

1. Plain Open End Shell 24" diameter, 46 3/8" long. 2. Flanged Shell 14" diameter, 16" high. 3. Special Tapered Shell 22" diameter, 15" high. 4. Heat Exchanger 29" diameter, 46" long. 5. Diffuser Tube 4" diameter, 24" high.

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Hackney MILWAUKEE

CONTAINERS FOR GASES, LIQUIDS, AND SOLIDS

of the most versatile systems of regulating the speed of a motor, according to K. A. Oplinger, research engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Instead of using a glass bulb below the column to act as a mercury reservoir, a stainless-steel bellows is used in this new experimental device. Sealed into the column rising above the bellows are electrical contacts, spaced roughly 1/16-inch apart. As the bellows is compressed the mercury rises and successively short-circuits contacts, forming a series of mercury switches.

Because of the large ratio of bellows area to the cross section of the capillary, only a slight compression of the bellows raises the mercury the full height of the tube. In fact, in the experimental model only 0.015-inch movement of the bellows covers or uncovers the 40 contacts, a ratio of about 150 to 1.

The bellows can be actuated by a mechanical driver, such as a cam or lever, so it can be used as a speed-control device, contacts in the tube controlling a motor rheostat; or an electro-magnetic element can make it respond to changes in voltage or current. Because of low voltage between adjacent contacts and because contacts are sealed in a hydrogen atmosphere, relatively large currents can be handled.

Downwash of Stack Gases Influenced by Wind

■ Wind velocity is the only weather condition influencing the downwash of stack gases, according to a booklet entitled, "A Study of Flow Phenomena in the Wake of Smokestacks," issued recently by the department of research, University of Michigan at Ann Arbor.

This downwash, it states, is accomplished in two steps. The first is induced by eddies in the wake of the stack, and the second is the dispersion of the gas within the turbulent mass of air above and behind the station buildings.

Prepared by R. H. Sherlock, professor of civil engineering, and E. A. Stalker, professor of aeronautical engineering, the booklet details the studies made by the men to determine the cause of downwash gases. It covers the mechanics of air flow and various wind tunnel tests, supporting them with diagrams and illustrations. The booklet is being offered for $1.

Processing of Metals

■ *Metal Processing*, by Orlan William Boston; cloth, 630 pages, 6 x 9 inches; published by John Wiley & Sons Inc., New York, for $5.

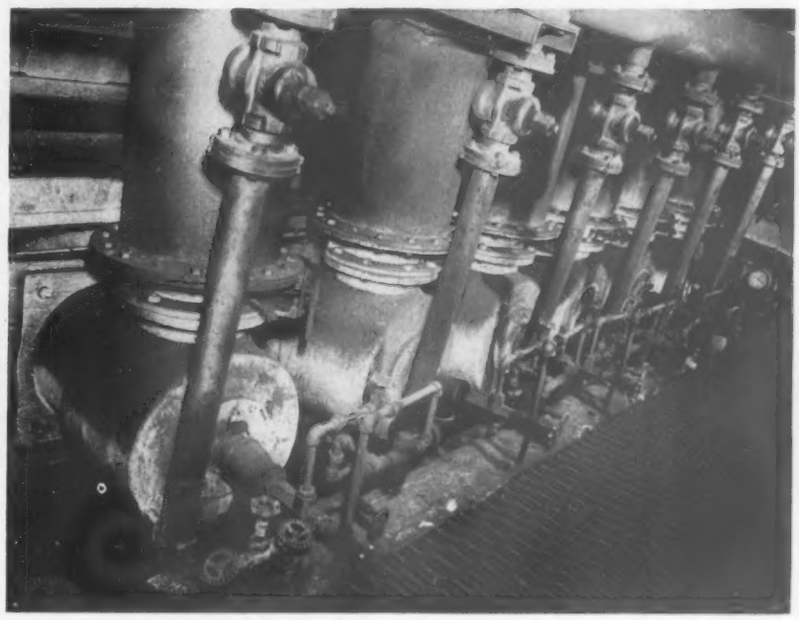
The author is professor of metal processing and chairman, department of metal processing, in the University of Michigan. The volume is intended as a college textbook but also is adaptable for short industrial courses. In view of the many illustrations of up-to-date machine tools, typical machining operations and comprehensive recommended practice it should be useful to production, tool and designing engineers, superintendents, foremen and draftsmen.

All steps involved in designing for production are covered in the first chapter. Subsequent chapters treat in detail the various classes of machines, processes and factors involved so that the student develops ability to plan from its drawings the production of a part for various conditions of quantity and quality.

Special emphasis is laid on nomenclature of tools and the subject of machinability. Extensive data show cutting forces, power, tool life, chip formation and surface quality as influenced by properties of the metal being machined, cutting fluid and tool shape and quality. Results of research and practice are co-ordinated.

In the present tremendous expansion of tool design and production, the wide range of specific practical recommendations covered in this book should find immediate use.

-BLOOM-
Long Flame Burners



A Battery of Bloom Combination Gas and Oil Burners used with Preheated Air in a Prominent Steel Plant.

The Bloom Long Flame Burner has been developed to improve the flexibility of operation of the modern Billet Heating Furnace. The burners pictured above can operate

1. **With gas as fuel;**
2. **With oil as fuel;**
3. **With oil and gas combined.**
4. **No interruption in burner operation when changing fuel from one to the other.**

Burners in successful operation with pre-heated air of 1500° F. on soaking pits, billet heating furnaces, and side door batch furnaces.

Write for complete information.

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Chicago District: 452 Grant St., Gary, Ind. *Phone:* Gary 5129

Basic Roofs

(*Concluded from Page* 64)

tions over silica furnaces, even with the comparative high cost of basic bricks. This item is aided by the reclaim value of basic brick material. After the used bricks have been moved around to other parts of the furnace and are finally no longer useful for this, they still have a value equal to chrome ore as a patching material.

It is therefore necessary in considering cost, to spread it over several campaigns, as subsequent furnaces are far less expensive than the first. Cost for additional structural work is nonrecurrent.

Taking American conditions and prices as a whole, it seems safe to expect a saving of 50 cents a ton of ingots and a 25 per cent increase in production. The production increase would come from higher rates per hour and greater number of operating hours about equalled.

Bricklaying and Steel Plant Refractories

By ALEX MORTON
Superintendent of Construction
Pittsburgh Steel Co.
Monessen, Pa.

■ BUILDING and maintenance of a modern steel plant requires many types of ceramic products, including fire brick, silica brick, red brick, ladle brick, basic brick, carbon brick, insulating brick, and plastics of all sorts.

In one of the large plants in the Pittsburgh district, several blast furnace foundations were built by the continuous pouring method, using red brick construction on the outer part of the foundations. The red brick walls were started at 27-inch thickness, and racked back 4 inches at a time to 13½ inches at a height of 4 feet, or scaffold high. Instead of putting in a scaffold the concrete was poured up to the height of the brickwork, and the same procedure used up to the height of the foundation. The brickwork was done in the day time, and the concrete was poured at night. Many good red bricklayers were made on such jobs, and the cost of the work has never been equaled for economy. These furnaces are over 30 years old, and in a good state of preservation today. There was no reinforcing of any kind in the stove and furnace foundations. Several of the present steel plant masonry superintendents were apprentices on these furnaces, and acquired a knowledge of masonry construction that is practically impossible to acquire today.

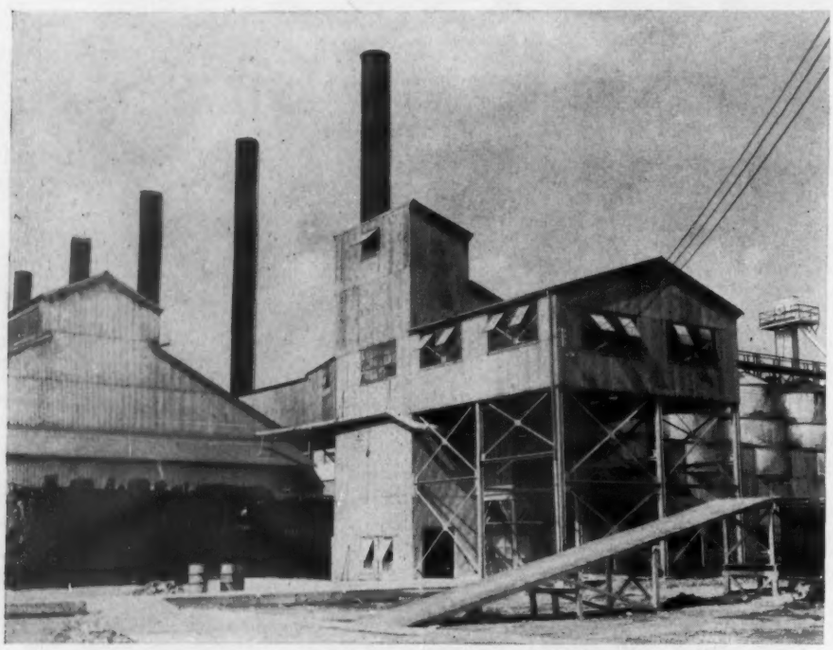
Furnace Life Extended

Metalkase brick are used extensively in front and endwall construction, replacing silica brick, and adding long life to the furnace. Plates are being used in frontwall construction instead of Metalkase brick, and it is a question which is the more economical in cost per ton of steel produced.

Several plants have tried basic shoulders on their roofs, but with poor results. Much thought is being given basic roofs, but there have been few installed on open-hearth furnaces. Until a good basic roof is developed, there cannot be much further progress made in open-hearth design inasmuch as the present type of roof will not withstand the temperatures required to make the alloy steels of today. However, we have had much encouragement recently on the progress being made in basic brick for roofs. It seems that the day of the old time first helper is gone. The

This article is from a paper presented at the autumn meeting of the American Ceramic Society, refractories division, Granville, O., Sept. 5-6.

Defense materials are produced in these galvanized ARMCO *Ingot Iron buildings. The metal is constantly subjected to a highly corrosive industrial atmosphere.*



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Use extra-durable galvanized ARMCO Ingot Iron* on your new buildings for long life and low maintenance costs. The American Rolling Mill Company, 2351 Curtis Street, Middletown, Ohio.

**For immediate painting and long paint life specify galvanized* ARMCO *Ingot Iron* PAINTGRIP *sheets.*

ARMCO INGOT IRON

old timer could bring a roof up to temperature hot enough to sweat the brick, and form a glaze, without burning the roof, and in doing so, change the structure of the silica, raising the fusion point of the brick. I suppose we do not have the time to train men to do this any more, but it pays big dividends in roof life.

In open-hearth furnace construction there has been a tendency to do rough brick work, and the recent shortages in good masons has not helped this situation. However, good masonry in open-hearth furnaces pays dividends, and ceramic and refractory engineers should encourage good work. During the depression few apprentices were trained, and every one blamed it on lack of work, but there was a shortage of good mechanics even during the depression, and more apprentices should have been trained. In a great many cases handy men are used. These men remain handy men and never become mechanics. There is a mistaken idea that it does not pay to train apprentices, but the high cost of masonry today, due to lack of trained men, is proof that it does pay, and yet, few apprentices are in the making today.

Suggests Brick Construction

So much concrete has been used in recent years, that little thought is given as to whether it might not be cheaper to construct a foundation or retaining wall of brick instead of concrete. In numerous cases the job can be constructed of brick and put into operation before the forms could be built for a concrete job, and at a lower cost.

Sometime ago the bedplate of a reversing type blooming mill engine broke, almost entirely due to the lack of proper grouting when it was set, and to the lack of care in tightening foundation bolts at intervals. The master mechanic, a veteran steam engine expert, blamed the brick foundation for the failure of the bed plate, and recommended taking 6 feet off the foundation and installing a reinforced concrete section on top of the remaining brick foundation. The mason superintendent, however, instructed the foreman on the job to take off one course at a time. After removing one course of brick, the engine expert was called on the job and asked to show where the brick foundation had failed, but he had to admit that it was as good as the day it was built. The new bed plate was set and grouted properly, and the same mill is rolling a lot of steel today. Vitrified brick laid up in a 2¼ to 1 mix and properly grouted have never been equaled for strength and durability, and in most cases are as cheap as concrete.

In soaking pit construction a great many plants use rough silica brick in the pit walls. Some plants are using silica stone with good results. However, the size and type of ingots, size and depth of pits all have a bearing on what the refractories should be. Where pits receive abuse, and repairs are frequent, silica brick make the quickest and most economical repairs.

Monolithic chrome bottoms are popular in heating furnaces, and in some cases the life of such installations is astonishing. Corindon brick are being used extensively in rod billet furnaces. Scale removal is simplified by their use.

Floors and runways require large amounts of paving brick. In years past it was customary to lay the paving brick on edge. Today, 3-inch brick are being used, laid flat and grouted. The regular herringbone method of paving, laid tight and grouted thoroughly, makes an excellent floor, if the base has been rolled and tamped properly. The grouting is important, and the brick should be thoroughly soaked with water before grouting. Care should be used in filling the joints to see that each one is completely filled. Two parts cement and one part sand mixed as a grout makes the best floor mix.

MAYBE your extinguishers can handle most fires . . . can snuff out ordinary blazes. But what about the *extra-dangerous* fires?

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For example, LUX can kill hidden fires . . . those blazes that lurk behind obstructions which baffle liquid-stream extinguishers. LUX gas leaves the nozzle expanding 45,000%! This terrific force drives the gas into every inch of fire area. LUX penetrates through tiny openings, scoots around corners. *It kills fires you can't even see!*

This is a fire fighting *plus* that you get with LUX—both portable extinguishers and built-in systems. It is one more reason why LUX protection means *added* protection, greater safety.

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1. LUX carbon dioxide gas is one of the fastest known extinguishing agents.
2. LUX extinguishers are effective on both electrical and flammable liquid fires.
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4. *45,000% expansion* drives LUX gas throughout fire area, despite obstructions.
5. Annual recharging is not necessary with LUX. Simply weigh periodically.
6. LUX service depots are maintained in principal cities.

LUX SNUFFS OUT FIRE

Walter Kidde & Company
Incorporated
932 West Street, Bloomfield, N. J.

Wing Tips

(Concluded from Page 48)

ship into production. "One hundred days after the preliminary design sketches were begun, the preliminary airplane was completed. And in one-half or one-third the time normally required, the new plane had been completely built, tested and accepted by Royal Air Force representatives, thereby releasing long assembly lines already formed," Mr. Burla explains.

Longest formation over-water flight by commercial land transports ever made was recorded when three new Douglas DC-3's set down on a Honolulu airport just under 14 hours after they left San Francisco, a distance of 2450 miles. The planes will go in service on Hawaiian Airlines, have been christened the HALEAKALA, the WAIALEALE and the MAUNALOA.

1941 Volume of "Aerosphere" Available for Distribution

Technical and statistical information relating to aircraft and aircraft engines is something which of necessity now comes under the stern surveillance of military censorship; nevertheless it is information vitally in demand by an upsurging aviation industry and its thousands of materials and parts suppliers.

Ably meeting this demand, in spite of censorship restrictions, is the 937-page volume *Aerosphere*—1941, published by Aircraft Publications Inc., 370 Lexington avenue, New York, and edited by Glenn D. Angle, at one time engineer in charge of aircraft engine design for the army air service and a former professor of mechanical engineering at Lawrence Institute of Technology in Detroit.

The volume is the second of its type, the first being *Aerosphere*—1939, and is considered the bible of the aviation industry of the world. Divided into four sections—modern aircraft, modern aircraft engines, aircraft statistics and a buyers' guide—it presents a formidable list of photographs, data and tabular matter of exceptional interest to both manufacturers of aircraft and their suppliers.

Three hundred and twenty pages are devoted to pictures and specifications of aircraft produced in all countries from Argentine to Zmaj. While many late model planes carry the terse phrase "No data available for publication," nevertheless in general a wealth of specifications accompanies each description.

The aircraft engine section comprises 160 pages and lists details of over 200 types of engines produced throughout the world, including experimental designs. The statistical section presents 112 pages of material, including world air records, air race results, personnel of congressional aircraft committees, CAA inspectors, personnel of various aviation organizations and government bureaus, CAA training schools, airports and landing fields, analyses of air transportation records, production figures up to 1937, etc.

Notable is the final section which offers a detailed listing of companies and organizations engaged in aircraft activities throughout the world. The list is a veritable bluebook of industries supplying materials, parts, accessories and equipment to the aviation industry, as well as builders of aircraft.

This encyclopedia of aviation may be purchased through the Penton Publishing Co., 1213 West Third street, Cleveland, for $10, plus shipping charges. Size is 9 x 12 inches, bound in cloth, weight about 5 pounds.

■ Combined net income earned in the first seven months this year by Class 1 railroads was $244,376,852 after interest and rentals, according to reports filed with the Association of American Railroads. Net income of these same roads in the corresponding period of 1940, and after interest and rentals, was $3,441,371.

New....

IMPROVED COVER FURNACES FOR *Sheets, Strip Coils, Wire*

NEW COVERS BUILT WITHOUT ALLOY TUBES

●

OLD COVERS REBUILT WITHOUT ALLOY TUBES

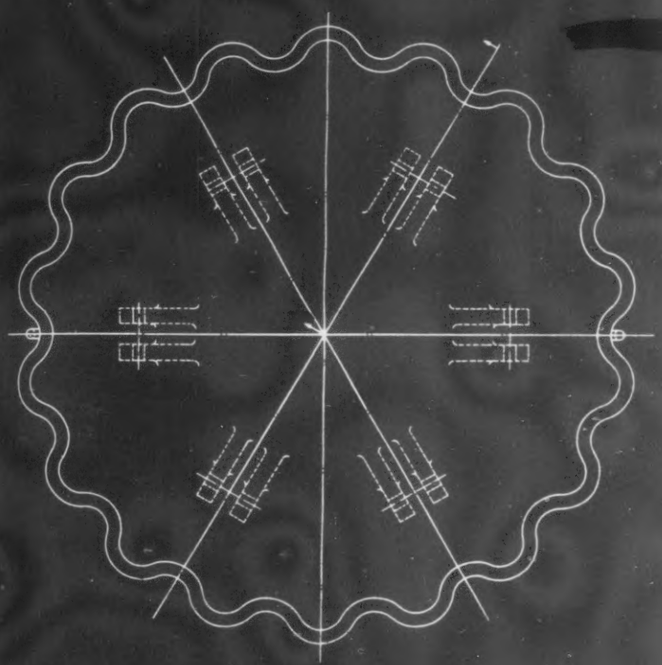
●

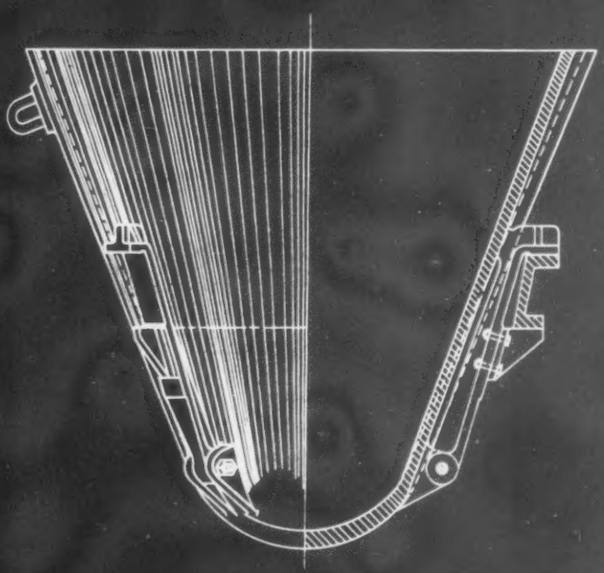
Plant tested, production proved P. I. E. cover furnaces meet the trend for better heating at lower cost. Results from installations in eight plants, some with as many as ten furnaces, prove their reliability in annealing of sheets, strip and wire under the most exacting conditions.

PENNSYLVANIA INDUSTRIAL ENGINEERS
BUILDERS OF ALL TYPES OF INDUSTRIAL FURNACES
2413 W. MAGNOLIA ST. PITTSBURGH, PA.

easier dumping and skulling
greater strength and flexibility
longer pot life

these are the advantages you get





WITH THE IMPROVED JOHNSTON CORRUGATED CINDER POTS

These outstanding advantages you get with the IMPROVED JOHNSTON CINDER POTS are made possible by the design, which has, as one of its features, greater wall area because of the corrugations for rapid dispersion of heat. Then, because all castings expand with heat and contract during cooling, the corrugations permit unrestricted expansion and contraction, and provide greater resistance to distortion and creep in the critical heat zone, which is in the middle third section of the pot.

Many of the largest steel plants in the country have standardized on Johnston Corrugated Cinder Pots, and during the past five years 75 per cent of all pots purchased have been Johnston Corrugated Cinder Pots.

Put these money-saving cinder pots to work in your open hearth and blast furnace departments—they will operate longer, more efficiently, and give you lower cost per ton of product. Wire, telephone or write for one of our engineers to discuss with you your slag handling problem. No cost or obligation.

Advantages of Johnston Corrugated Cinder Pots:
Longer life . . . Quicker cooling of slag . . . Stronger, safer pots . . . Permits unrestricted expansion and contraction . . . Pot walls relieved of all tension—walls supported in compression . . . Pots supported from coolest point . . . Uniform support of pot, regardless of misalignment of bail ring.

MACKINTOSH-HEMPHILL COMPANY • Pittsburgh and Midland, Pa.

Mackintosh-Hemphill Company is the exclusive licensee for the manufacture and sale of Johnston Patented Corrugated Pots and Supports.

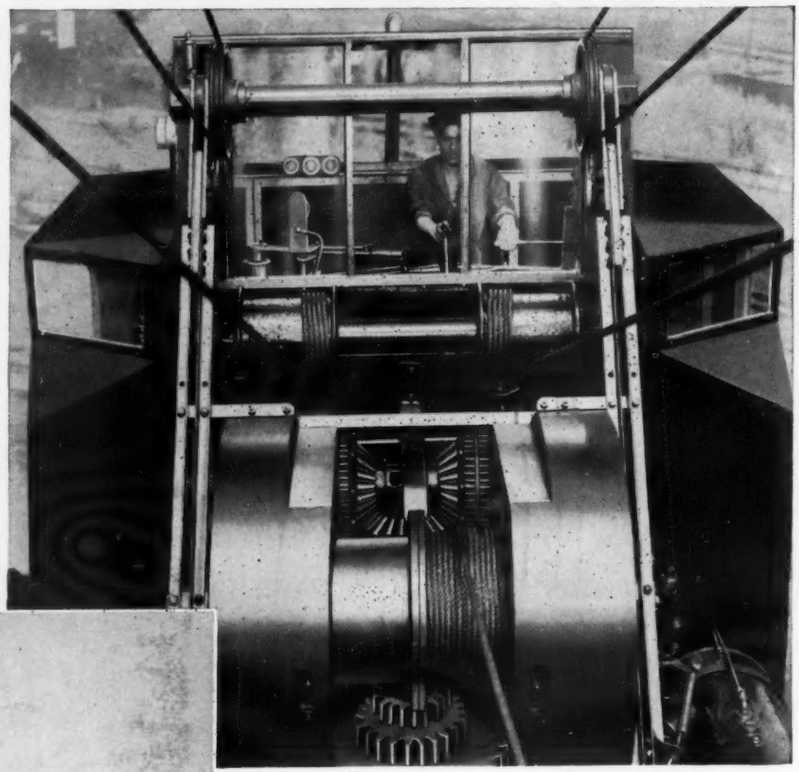
Other Mackintosh-Hemphill Company Products:

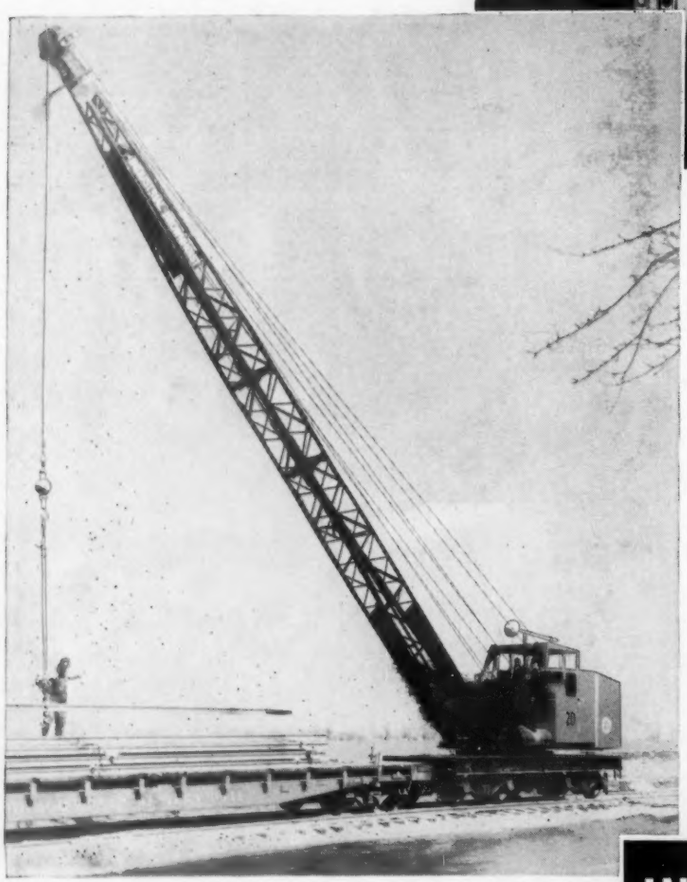
"Techni" Process Rolls . . . Rolling Machinery . . . Shape Straighteners . . . Strip Coilers . . . Shears . . . Levellers Pinions . . . Special Equipment . . . Iron-Steel Castings . . . And the New Abramson Straighteners for solid rounds, pipe, tubing—for sizing and polishing.

360° CLEAR VISION...

MONITOR-TYPE CAB PROVIDES VISION FROM BOOM TIP TO ROPE DRUMS

Surrounded by glass windows an operator in the new, patented, Industrial Brownhoist Monitor-type cab has perfect vision to front, back and both sides. He can clearly see what he is doing at all times whether it be lifting materials or switching freight cars. In addition to 360° visibility, ventilation is far better than in ordinary cabs and motor noise and heat are greatly reduced.





And yet the new Monitor-type cab is only one of the many advantages you get in an Industrial Brownhoist gasoline or Diesel locomotive crane. Booms are constructed for maximum strength with a minimum of weight. Power plants develop more power and use less fuel than ever before. Under carriages are built to the same standards as the heaviest railroad tenders. In fact, from every standpoint, the Industrial Brownhoist cranes of today are designed and built to insure longer crane life, lower operating costs and greater operator efficiency. Write today for further facts.

BAY CITY, MICHIGAN • DISTRICT OFFICES: NEW YORK
PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

INDUSTRIAL BROWNHOIST
BUILDS BETTER CRANES

Pressure for Steel Is Less Insistent

Users find priorities preclude heavy buying. September pig iron allocated by OPM. Record made in steel production. Scrap scarcity grows

MARKET IN TABLOID ★

Demand
Inquiry light under priority.

Prices
Some scrap violations reported.

Production
Advanced 1 point to 96½ per cent.

■ WHILE some steel sellers find little change, steel inquiry in general continues light. Mills still have more orders than they can handle, attributable to several reasons, including a wave of anticipatory buying in recent weeks and uncertainties confronting numerous companies engaged in nondefense work.

Many commercial companies in late July and early August deluged mills with tonnage despite the fact no delivery promise could be made and probable delivery was months away. Considerable of this tonnage was accepted on this indefinite basis and buyers are awaiting results. It appears futile to attempt placing of further orders. Mandatory priorities have tended to lessen efforts to get steel until the consumer can obtain defense work.

Opinion is growing that application of steel priorities will reveal that defense needs require considerably less proportion of output than has been thought. Filing of priority forms is having the effect of wiping considerable duplicate tonnage off books and existence of some large inventory is revealed, both tending toward better distribution. Some mills with diversified production have completed scheduling September tonnage and find total priority orders will require only 40 to 60 per cent of production. This leaves considerable margin for shipment to nondefense users. Mills producing special steels have a higher proportion of priority tonnage. It is believed later months will bring a better situation as the plan works more smoothly.

New records were made in steel production for August and for first eight months. August steel ingot output at 7,000,957 net tons, was the largest in history for that month, 13 per cent over the corresponding month in 1940. Production in eight months this year, 41,316,410 tons, was 32 per cent above the comparable period in 1940; 24 per cent over the previous record in 1929, 44,137,164 tons, and exceeded production in the full year 1917 by almost 10 per cent.

Shipments of finished steel by the United States Steel Corp. in August paralleled this record, 1,753,665 tons being moved, the largest monthly record in the organization's history. Shipments in eight months were also the largest for that period, 13,473,209 tons, 49.03 per cent over the comparable period last year, and 10.6 per cent over the previous record of 12,187,424 tons in eight months in 1929.

Allocation of September pig iron production by OPM has been completed and melters view the result with mixed feelings. In some cases tonnages asked went through with little change, while in others allowances were cut by 50 per cent or more. In cases where melters had considerable iron on yard allocation was decreased. Some claims have been made of inequitable distribution but for most part the output was divided to give best results.

Scrap continues scarce and melters are seeking larger supplies wherever they are available. Most consumers and suppliers are adhering to ceiling prices but reports are heard of violations, especially in the East. Some observers believe the price maximum will break down again as scarcity continues. More direct dealing is being done between producers and consumers, short circuiting dealers.

Treasury procurement division is placing orders for semifinished steel for Britain to maintain shipments at 250,000 to 300,000 tons each quarter, and is closing orders for about 80,000 tons of finished steel and 35,000 tons of rails. Tin plate for British colonies is being shipped at the rate of 420,000 tons per year. Some skelp is being placed for shipment to India.

Automobile production last week totaled 53,165 units, a gain of 20,225 from the preceding week, which contained Labor Day. Production in the corresponding week last year was 66,615..

Steelworks operations last week regained the ½-point lost the preceding week, returning to 96½ per cent of capacity. Detroit advanced 8 points, to 94 per cent; Pittsburgh, 1 point, to 99 and Youngstown, 2 points to 98. Cleveland lost 3 points, to 92. Rates were unchanged, as follows: Chicago 101, Eastern Pennsylvania 95, Buffalo 90½, Birmingham 95, Cincinnati 89, St. Louis 98, Wheeling 94 and New England 90.

Composites are frozen at $56.60 for finished steel, $38.15 for iron and steel and $19.16 for steelworks scrap.

COMPOSITE MARKET AVERAGES

	Sept. 13	Sept. 6	Aug. 30	One Month Ago Aug., 1941	Three Months Ago June, 1941	One Year Ago Sept., 1940	Five Years Ago Sept., 1936
Iron and Steel	$38.15	$38.15	$38.15	$38.15	$38.15	$37.93	$34.15
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.60	53.10
Steelworks Scrap..	19.16	19.16	19.16	19.16	19.16	20.05	16.18

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Sept. 13, 1941	Aug. 1941	June 1941	Sept. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to $\frac{9}{32}$-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Sept. 13, 1941	Aug. 1941	June 1941	Sept. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.00	24.00	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.15
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	17.75	19.70
Heavy melting steel, Chicago	18.75	18.75	18.75	19.30
Rails for rolling, Chicago	22.25	22.25	22.25	21.35
No. 1 Cast, Chicago	20.00	21.50	21.50	16.85

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$4.75
Connellsville, foundry, ovens	7.25	7.25	7.25	5.75
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. mill, carloads.

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base .. 3.05c
Granite City, base 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. ... 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base..... 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.
Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.
Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.
Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base..... 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City	Base Deliv. Mahoning Valley Points
Field gr.	3.20c	3.95c	3.30c	3.275c
Armat.	3.55c	4.30c	3.65c	3.625c
Elect.	4.05c	4.80c	4.15c	4.125c

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. ... 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less..... 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	...	*18.00	19.00	...	...
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	...	...
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
403	21.50	24.50	29.50	21.25	27.00
410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
430F	19.50	22.50	29.50	18.75	24.50
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Motor	4.95c	5.70c	5.05c	5.025c
Dynamo	5.65c	6.40c	5.75c	5.725c
Transformer				
72 ...	6.15c	6.90c	.....	6.225c
65 ...	7.15c	7.90c	.....	7.225c
58 ...	7.65c	8.40c	.....	7.725c
52 ...	8.45c	9.20c	.....	.....

Other Mich. pts. del. ... 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over..... 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. ... 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box..... $5.00
Granite City $5.10

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed..... 4.05c

Long Ternes

Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c
Pacific Ports 4.55c

Spl. Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box..... $4.30
Granite City $4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb....	$12.00	25-lb....	$16.00
15-lb....	14.00	30-lb....	17.25
20-lb....	15.00	40-lb....	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont....2.10-2.35c
Gulf ports 2.45c
Pacific Coast ports 2.65c

Steel Floor Plates

Pittsburgh 3.35c
Chicago 3.35c
Gulf ports 3.70c
Pacific Coast ports 4.00c

Structural Shapes

Pittsburgh, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20
4100 .15-25 Mo.			0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni.			1.20
5100 80-1.10 Cr.			0.45
5100 Spr. flats			0.15
6100 Bars			1.20
6100 Spr. flats			0.85
Carb., Van.			0.85
9200 Spr. flats			0.15
9200 Spr. rounds, squares			0.40
T 1300, Mn, mean 1.51-2.00			0.10
Do., carbon under 0.20 max.			0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars *(New Billet)*

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars *(Rail Steel)*

Pitts., Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar ... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails $2.55

(Per Pound)

Polished fence staples .. 2.55c
Annealed fence wire 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C. L. column) .. 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire at Birmingham)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

Rails, Fastenings

(Gross Tons)

Standard rails, mill $40.00
Relay rails, Pittsburgh 20—100 lbs. 32.50-35.50
Light rails, billet qual., Pitts., Chicago, Bham. $40.00
Do., rerolling quality.. 39.00

Cents per pound

Angle bars, billet, mills. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.75c
Do., heat treated 5.00c
Car axles forged, Pitts., Chicago, Birmingham.. 3.15c
Tie plates, base 2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller ... 65½ off
Do., ⅝ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter ... . 61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	..

Hexagon Cap Screws

Upset 1-in., smaller ....60 off

Square Head Set Screws

Upset, 1-in., smaller ....68 off
Headless, ¼-in., larger ..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅞-inch and under .....65-5 off
Wrough washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. .....$4.00 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.00
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Welded Iron, Steel, Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

In.	Steel Blk.	Steel Galv.
½	63½	51
¾	66½	55
1—3	68½	57½
	Iron	
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

	Steel	
2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½
	Iron	
2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe, Plain Ends

	Steel
1 to 3, butt weld	71½
2, lap weld	64
2½ to 3, lap weld	67
3½ to 6, lap weld	69
7 and 8, lap weld	68

Seamless, 3 pts. lower discount.

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham .. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in. 52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.) $2.00
Do., over ⅜ to 41/64-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 11.75
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.25
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.25c
Do. (1000 lbs. or over) 13.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $30.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	....	....	....
Sharpsville, Pa.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	....	24.50	....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	....	25.11	....
Boston from Birmingham†	25.12	....	....	....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	....	....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	....	....	....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	....
Cincinnati from Birmingham†	24.06	....	23.06	....
Cleveland from Birmingham†	24.12	....	23.12	....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	....	....
Newark, N. J., from Birmingham†	26.15	....	....	....
Newark, N. J., from Bethlehem	26.53	27.03	....	....
Philadelphia from Birmingham†	25.46	....	24.96	....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	....
St. Louis from Birmingham	†24.50	....	23.62	....
St. Paul from Duluth	26.63	26.63	....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide. net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00
Do., barge	23.00
No. 2 lump	23.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty paid, sbd. $120.00; Carlots, del. Pitts. 125.33; Carlots, f.o.b. Southern furn. 145.00. For ton lots add $10, for less-than-ton lots $13.50, for less than 200-lb. lots $18.

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50; Do., ton lot 87.00; Do., 75 per cent 135.00; Do., ton lots 151.00. Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00; 1½% carbon 128.00. Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c; Do., ton lots 11.75c; Do., less-ton lots 12.00c; less than 200 lb. lots 12.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Molybdenum Oxide, lb. Molyb. cont., 5-20-lb. containers, f. o. b., Washington, Pa., and Langeloth, Pa., lb. 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots 1.23; Do., less-ton lots 1.25; 20-25% carbon, 0.10 max., ton lots, lb. 1.35; Do., less-ton lots 1.40. Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls 2.25; Do., less-ton lots 2.30. Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton 142.50; Do., spot 145.00; Do., contract, ton lots 145.00; Do., spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50; Do., spot 160.00; Do., contract, ton lots 160.00; Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c; Do., ton lots 8.00c; Do., less-ton lots 8.50c. Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 7.00c; Do., ton lots 7.50c; Do., less-ton lots 7.75c; Do., less 200 lbs. 8.00c. Spot ¼c lb. higher

Tungsten Metal Powder, 98-99 per cent, per lb., depending upon quantity 2.50-2.60

Vanadium Pentoxide, contract, lb. contained 1.10; Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c; Do., spot 85.00c; 88% chrome, cont. tons 79.00c; Do., spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ¼-in., lb. 14.50c; Do., 2% 13.00c. Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton 74.50; Ton lots 84.50; Less-ton lots, lb. 4.00c; Less 200 lb. lots, lb. 4.25c. Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c; Ton lots 6.00c; Less-ton lots 6.25c. Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50; Do., ton 108.00; 35-40%, contract, carloads, lb., alloy 14.00c; Do., ton lots 15.00c; Do., less-ton lots 16.00c. Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. 2.60; Do., 100-200 lb. lots 2.75; Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	5.26	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.85	5.25	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.75	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.79	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	....	5.25	....	7.15	....	....
Seattle	4.00	4.00	5.20	4.75	4.75	6.50	4.75	7.25	6.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	5.45	7.25	4.95	4.95	7.20	5.10	7.30	6.30	....	6.60	11.35	10.35
San Francisco	4.00	5.20	6.80	4.70	4.70	6.40	4.70	7.20	6.45	....	7.05	11.60	10.60

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.65	....	8.75	8.60	9.40
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	6.05	10.60	9.60	9.45	10.10

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300 pounds and over, Portland, Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis; Los Angeles, bars over 4-in. wide, 1-in. thick, 4.95c.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 1 to 10 bun. in Los Angeles; 300 and over in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; any quantity in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle, 1 to 99 pounds in Los Angeles; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.79c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

	£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00 $25.79	6	8	0(a)
Basic pig iron 24.28	6	0	6(a)
Furnace coke, f.o.t. ovens 7.40	1	16	9
Billets, basic soft, 100-ton lots and over 49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over 2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch 3.17c	17	12	0††
Shapes 2.77c	15	8	0††
Ship plates 2.91c	16	3	0††
Boiler plates 3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over 4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over 4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over 4.28c	23	15	0
Bands and strips, hot-rolled 3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00-25.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton	.....

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	.....
So. African, 48%	70.00-72.00
Brazilian, 46%	69.00-71.00
Chilean, 47%	65.00-70.00
Cuban, 50-51%, duty free	.....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

OTHER THAN RAILROAD GRADES (a) (b)	Pittsburgh, *Wheeling *Johnstown, Weirton, Steubenville	Youngstown, *Warren, Canton, Sharon	Chicago	Kokomo, Ind.	Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	*Cincinnati Ashland, Ky. Portsmouth, O. Middletown, O.	St. Louis	Detroit	Duluth	Birmingham	Alabama City, Atlanta	*Pacific Coast	Minnequa, Colo.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50	$17.50	$17.85	$18.00	$17.00	$17.00(d)	$14.50	$16.50
No. 1 hyd. comp. black sheets	20.00	20.00	18 75	18.25	18.25	18.75	18.75	19.50	19.25	19.50	17.50	17.85	18.00	17.00	17.00(d)	14.50	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.50	17.25	17.50	15.50	15.85	16.00	15.00	15.00(d)	12.50	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.75	14.50	14.75	12.75	13.10	.....	12.25	12.25	9.75	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	15.50	15.00	15.00	10.00	12.00
Shovel turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	16.00	15.75	16.00	14.00	14.35	16.50	16.00	16.00	11.00	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	19.00	18.75	19.00	17.00	17.35	17.50	16.50	16.50	14.00	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	13.50	12.50	12.50	10.00	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.25	15.00	†15.25	13.25	13.60	13.75	12.75	12.75	10.25	12.25
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	18.50	16.85	17.00	16.00	16.00	13.50	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00	20.00	20.35	19.00	20.00	.....	18.00	.....
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50	18.50	18.85	17.50	18.50	.....	17.00	.....
Stove plate	19.00	.....	17.00	16.00	18.00	18.50	18.00	18.00	19.00	17.50	17.00	14.10	16.00	17.00	.....	14.00	.....
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.50	24.25	23.50	22.50	22.85	23.00	22.00	.....	19.50	.....
Low phos. bar crops and smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	19.50	.....
Low phos. punch., plate scrap**	23.00(c)	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	17.50	.....
Machinery cast cupola size***	22.00	22.00	21.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00	21.00	21.35	20.00	21.00	.....	19.00	.....
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Punchings and plate scrap††	22.00(c)	22.00	20.75	20.75	20.25	20.75	20.75	21.50	21.25	20.50	19.50	19.85	20.00	19.00	.....	16.50	.....
Punchings and plate scrap§§	21.00(c)	21.00	19.75	19.75	19.25	19.75	19.75	20.50	20.25	19.50	18.50	18.85	19.00	18.00	.....	15.50	.....
Heavy axle and forge turnings	19.50(c)	19.50	18.25	18.25	17.75	18.25	18.25	19.00	18.75	18.00	17.00	17.35	17.50	16.50	.....	14.00	.....
Medium heavy elec. furnace turnings	18.00(c)	18.00	16.75	16.75	16.25	16.75	16.75	17.50	17.25	16.50	15.50	15.85	16.00	15.00	.....	12.50	.....
GRADES ORIGINATING FROM RAILROADS															Kansas City		
No. 1 R.R. heavy melting steel	21.00	21.00	19.75	19.25	.....	19.75	19.75	20.50	20.25	20.50	18.50	18.85	19.00	18.00	17.00	15.50	.....
Scrap rails	22.00	22.00	20.75	20.25	.....	20.75	20.75	21.50	21.25	21.50	19.50	19.85	20.00	19.00	18.00	16.50	.....
††Rerolling quality rails	23.50	23.50	22.25	21.75	.....	22.25	22.25	23.00	22.75	23.00	21.00	21.35	21.50	20.50	19.50	18.00	.....
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	.....	22.75	22.75	23.50	23.25	23.50	21.50	21.85	22.00	21.00	20.00	18.50	.....
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	.....	23.00	23.00	23.75	23.50	23.75	21.75	22.10	22.25	21.25	20.25	18.75	.....
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	.....	23.25	23.25	24.00	23.75	24.00	22.00	22.35	22.50	21.50	20.50	19.00	.....

*Johnstown, Pa., Warren, O., and Cincinnati, O., not bases for railroad grades; Wheeling railroad only. Eastern Pa. includes Coatesville, Claymont, Conshohocken, Phoenixville and Harrisburg as bases only for "other than railroad grades"; Philadelphia and Wilmington are bases only for railroad grades. Pacific Coast bases are Los Angeles, San Francisco, Seattle, Portland. †Base price at Portsmouth; Middletown 25 cents less and Ashland, Ky; ††The term 'rails for rerolling' includes any rails which are sold to be used for rerolling, irrespective of whether or not such rails are usable for re-laying. **⅜-inch and heavier, cut 12 inches and under; ***may include clean agricultural cast; ‡‡under ⅝-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under. (c) add $1.75 at Pittsburgh. (d) Bases at Atlanta only.

OTHER BASE PRICES: Machine shop turnings $17.60, Alloy, W. Va., $13.35 Toledo, O.; **Shoveling turnings,** $14.35 Toledo; **cast iron borings,** $13.60 Toledo; **No. 1 cupola cast,** $19 Minneapolis and St. Paul, $20.50 Chattanooga, $21 Radford, Va. and $22 Phillipsdale, Bridgeport and Worcester; **Heavy breakable cast,** $20.50 Phillipsdale, Bridgeport and Worcester, $17.50 Minneapolis and St. Paul; **Stove plate** $16 Minneapolis and St. Paul, $17.50 Chattanooga, $18 Radford, Va., $15.60 Toledo and $17.50 Phillipsdale, Bridgeport and Worcester; **Machinery cast cupola size** $21.50 Chattanooga, $22 Radford, Va. and $23 Phillipsdale, Bridgeport and Worcester; **No. 1 machinery cast, drop broken** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester; **Clean auto cast** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester.

(a) The grades specified are, except dealers' No. 1 and No. 2 bundles and uncut structural and plate scrap, as named and defined in the simplified recommendations R-58-36 of the Department of Commerce which shall be the governing specifications for iron and steel scrap hereunder (other than railroad grades). Dealers' No. 1 bundles shall consist of new, clean black sheet scrap, hydraulically compressed in the dealer's yard. Dealers' No. 2 bundles shall consist of old fender and body scrap, and shall in no case command a premium. (b) These grades (other than railroad grades) represent the major classifications of iron and steel scrap. The maximum prices of superior or inferior grades shall continue to bear the same comparable relationship to those major grade classifications as heretofore existed between the prices of such superior or inferior grades and the prices of the major grades.

Maximum price at shipping point: A shipping point is the point from which the scrap is to be shipped to a consumer. Maximum price at which a grade of scrap may be sold f.o.b. its point of shipment is the shipping point of such scrap. **For shipping points located within a basing point,** the shipping point price is determined by taking the basing point price and deducting actual transportation costs to the consumer's plant within the basing point. **For shipping points outside a basing point,** the shipping point price is determined by taking the nearest basing point and subtracting the lowest transportation charge. (Example: No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located.) **Exceptions:** Shipping point of any grade not listed as having a basing point in New England is the Johnstown base minus the all-rail freight from the shipping point to Johnstown. Shipping point prices for New York City, Brooklyn, New York and New Jersey must be computed on the basis of the Bethlehem base although nearer to Buffalo in terms of barge transportation.

Maximum prices to consumers: Maximum price at which any grade (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, not more than 75 cents per gross ton may be included for handling charges at dock. Maximum delivered price in no case shall exceed by $1 a ton the nearest maximum base price in terms of transportation charges. (Example: The $1 excess is the so-called "springboard" arrangement. Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the "springboard" limit of $1 over the Youngstown base of $20.)

Billet and bloom crops originating in the Pittsburgh district may be sold within or without the district at the Pittsburgh base price plus up to, but not more than $2.50 in transportation charges. Maximum prices for **unprepared scrap** shall be $2.50 a ton less than the maximums for corresponding grade or grades of prepared scrap. **Remote scrap** is material located beyond the zone from which the railroad freight rate to Pittsburgh is $11.20 and a consumer may obtain permission from OPACS to absorb transportation charges necessary to obtain 500 tons or more.

Railroad grades: Where a railroad operates in two or more basing points, the highest base applies to consumers anywhere on the line. (Example: New York Central Railroad uses the $21 Pittsburgh base on No. 1 steel since the P. & L. E. operates there). Exception: Switching charges of 84 cents a ton must be subtracted from prices on scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. Where railroad scrap is shipped to an off-the-line consumer, the highest maximum on-the-line price or the nearest basing point price, whichever is higher, applies.

Commissions: Brokers are allowed a commission up to 50 cents a ton above maximum prices to consumers, including export.

Export prices: Maximum on No. 1 heavy melting steel (other than railroad) is the domestic shipping point price plus lowest transportation charge to point of export. Maximum price to a domestic consumer on line of the originating railroad plus transportation to point of export applies on No. 1 railroad steel. Customary differentials apply on other railroad and non-railroad grades.

LOGEMANN
Presses for Sheet Scrap

THE NATION NEEDS YOUR SHEET SCRAP!

In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

The line includes scrap presses *designed for mill service,* presses *designed for automobile plant conditions,* presses *designed for general plant applications.*

Write for details.

The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

LOGEMANN BROTHERS COMPANY
3126 W. Burleigh St., Milwaukee, Wisconsin

Sheets, Strip

Sheet & Strip Prices, Page 192

Sheet production is almost entirely for defense requirements, though some makers believe nondefense users will be able to obtain better shipments after Oct. 15. Some current preference tonnage is being interpolated in schedules from time to time without marked delay in production.

Not all confusion over filing of forms has disappeared but in the main consumers have complied with requirements and paper work by mill offices has been greatly reduced, though still fairly heavy.

Galvanized sheet production has tended to increase as supply of zinc has been made available, but still is far short of requirements. Users of this grade of sheets have adapted themselves to other material in many cases.

Makers of steel barrels and drums are to meet OPM officials early this week to arrange for steel supply beyond October, when the present provision expires. These makers, under priority rating of A-5, have been assigned two-thirds of the base quantity for September and October. Many of these products are important in transportation of oil and aviation gasoline for defense.

More than 1000 tons of sheets and strip are reported to have been sold in Detroit recently at 5 to 10½ cents for common grades. The sale is said to have been made by a dealer in seconds desirous of closing out his stock and part was disposed of by a bank which liquidated the plant of a former consumer.

While sheet inquiry is less active than prior to the M-21 ruling, sellers are confronted with a heavy volume of demand for various types of defense work.

Manufacturers of refrigerators, washing machines and other household appliances expect to be advised shortly by Washington of official limitations on their production and this combined with the fact that they have placed all the steel they can reasonably expect to receive for some time to come, is already causing them to restrict inquiry.

Some of these companies are doing some defense work, however, and some, including stove makers, having relatively little defense business, are working hard to obtain contracts carrying priorities.

Plates

Plate Prices, Page 192

An easier situation in plates will result from decision not to build the $80,000,000 pipe line from Texas to the New York area. Investigation of the oil and gasoline situation in the east has dispelled the idea of shortage and the line is not deemed necessary, especially in view of the greater need for steel plates for defense use. Lower railroad rates on eastbound petroleum shipments will bring tank cars into use and relieve the situation imposed by diversion of tankers from coastwise trade.

Defense needs continue to take a heavy tonnage, shipbuilding needs expanding as new ways are completed and specifications filed for material to be fabricated on them. Deliveries for this purpose have kept up with needs and in some cases stock has been accumulated. Railroad car builders are still hampered somewhat by lack of plates and other steel material, though deliveries are better under the priority rating recently given them. Under present conditions builders believe they will be able to complete a large number of cars but some now on books will not be delivered until next year. Tank builders are busy and are able to obtain sufficient plates to meet requirements, the larger portion of which is for defense, principally for army and navy bases.

Plate consumers without particularly high priorities will have difficulty getting tonnage for delivery over the remainder of this year and probably over the next six or seven months at the least, for an increasing quantity of high preference tonnage is still coming out.

While jobbers now have an A-9 rating, it appears likely they will be unable to obtain much of whatever quotas are later announced for fourth quarter. Where they have special jobs taking particularly high ratings they should be fairly successful, although such tonnages, it is pointed out, would have to apply against the quotas stipulated.

PLATE CONTRACTS PLACED

1,256 tons, four underground fuel tanks, for Umatilla, Oreg., supply station, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Bars

Bar Prices, Page 193

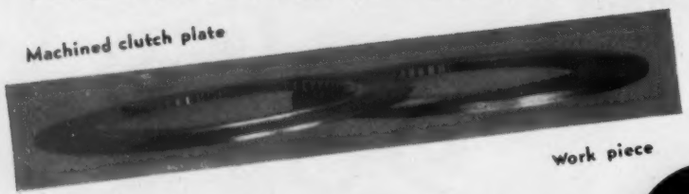
Civilian bar users find their situation little improved under priority although elimination of surplus inventory may release some tonnage later for nondefense use. Some steelmakers find they are able to care for all defense demands with little more than half their capacity and this offers hope of better supply to those without priority when the situation clears. Farm implement manufacturers with B-1 rating believe they will receive better supply than in the recent past as soon as mills finish classifying their orders in the light of consumers' reports.

Edgemoor Iron Co., Edgemoor, Del., has distributed orders for about 60,000 tons of shell steel, covering two contracts, one from the navy and the other from the army.

Small users of bars expect better service for their needs as soon as warehouses begin receiving shipments under their new priority rating.

Some bar consumers find shortage of other materials entering into their products is hampering

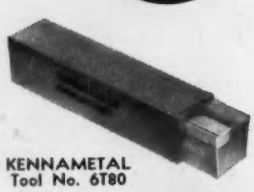
KENNAMETAL TOOLS



Contribute to "ALL OUT" Production to Mechanize the U. S. ARMY . . . .

Tanks are vital in modern warfare . . . and KENNAMETAL steel-cutting carbide tools are vital in maintaining tank production schedules. Clutch plates, for example, are straddle-faced with Styles No. 3 and No. 6 KENNAMETAL tools at 260 ft. per min. and with 25 to 35 pieces per grind per set of tools. Because the KENNAMETAL tools wear uniformly, there is no "weaving" or "chattering" of the work piece—despite the thin sections being machined.

Shipping schedules for KENNAMETAL tools are entirely determined by Priority Ratings; however, good deliveries are being made on tools for non-defense work. Faster deliveries can be made on Standard KENNAMETAL tools and blanks than on non-standard items. Write for details.


KENNAMETAL Tool No. 6T80

KENNAMETAL Tool No. 3T80

McKENNA METALS Co.
200 LLOYD AVE., LATROBE, PENNA.
FOREIGN REPRESENTATIVES U.S. STEEL EXPORT CO.
(Exclusive of Canada, Great Britain and Possessions)

production to an extent that renders their bar supplies useless for the present. A roadbuilding equipment maker in the Midwest is unable to complete his product, involving a large tonnage of bars, because of inability to obtain other materials.

Pipe

Pipe Prices, Page 193

Producers are assigning steel pipe to consumers in line with the OPM order, at one-third the first quarter rate. This ruling has aroused jobbers and other suppliers of merchant pipe, who are negotiating with mills for as large tonnage as posible.

The navy is now ordering large quantities of small diameter seamless tubes for marine boilers for storage and upkeep work rather than new installations. Mechanical tubing is being sold in large quantities for aircraft work and gun mounts. Such civilian users as bicycle makers apparently realize the futility of making inquiry.

Cast iron pipe producers are limited in production by tonnage of pig iron allowed under the September allocation by OPM. In some cases this proves less than sufficient for capacity operation. Buying of this grade of pipe for nondefense use has declined, as deliveries are greatly extended.

CAST PIPE PLACED

650 tons, various sizes, San Diego, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

307 tons, 6 to 10-inch, Vallejo, Calif., to Pacific States Cast Iron Pipe Co., Provo, Utah.

214 tons, 6-inch, Class 250, Burbank, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

CAST PIPE PENDING

3500 tons, 6 to 12-inch Los Angeles; bids Sept. 9.

1068 tons, 4 to 8-inch, east bay municipal utility district, Oakland, Calif.; bids Sept. 10.

Rails, Cars

Track Material Prices, Page 193

Railroads appear to have placed most of the rolling stock orders they plan to buy for this year, but probably a large tonnage of rails remains to be placed late in the year, for which programs now are being formulated.

A feature of the past week was placing of 20 diesel-electric switch engines by the Southern Pacific. Other placements were small.

One reason for the lull in car buying is said to be uncertainty of wage negotiations, which may be a factor for the next 30 days, until a settlement is obtained. Equipment builders attribute it partially to difficulty in obtaining steel.

LOCOMOTIVES PLACED

Chicago & North Western, two diesel switchers, to American Locomotive Co., Schenectady, N. Y.

Southern Pacific, twenty 1000-horsepower diesel-electric switch engines; 15 to American Locomotive Co., New York,

1916 *Silver Anniversary Year* 1941

THE OHIO CARBON CO.

BOOTH No. 50

Iron & Steel Exposition, Cleveland Public Auditorium

Offers

COMPLETE BRUSH SERVICE

This means

IMMEDIATE ECONOMIES IN YOUR MOTOR MAINTENANCE

ASK

About our survey for a *free* analysis of *your* brush requirements.

GRADES

For all types of *commutating equipment* from *fractional* to *heavy duty* horse power—we would like to tell you about the *many grades* we have developed for *unusual* conditions, caused by humidity, dust, fumes etc.—we likewise offer *scientifically modified* grades for specialties, contacts, carbon seals, rings and special shapes.

GET

More mileage out of your DINKEY CONTROLLER and WELDER BRUSHES. *Ask about this.*

SOMETHING NEW

In the *care of commutators* and *rings.* Our Engineers will be glad to give you details.

TRIP

We will *gladly* arrange a trip through our plant. *Please* register at our *booth.*

and five to Baldwin Locomotive Works, Eddystone, Pa.

CAR ORDERS PLACED

American Car & Foundry Co., authorized by Interstate Commerce Commission to build five riveted aluminum alloy tank cars for experimental service.

CAR ORDERS PENDING

Capital Transit Co., Washington, 67 trolley cars; bids Sept. 16.

BUSES BOOKED

A.c.f. Motors Corp., New York: Five 33-passenger for Interurban Transportation Co. Inc., Alexandria, La.; four 34-passenger for Williamsport Transportation Co., Williamsport, Pa.; eight 29-passenger for Santa Fe Trail Transportation Co., Chicago; five 33-passenger for Southeastern Greyhound Lines, Lexington, Ky.; three 31-passenger for Central Avenue Bus Co. Inc., Jersey City, N. J.; two 38-passenger for Rapid Transit Inc., Saugus, Mass.; two 29-passenger for Vermont Transit Co. Inc., Burlington, Vt.; two 33-passenger for New England Transportation Co., New Haven, Conn.; two 33-passenger for Warwick, Greenwood Lake & New York Stages Inc.

Structural Shapes

Structural Shape Prices, Page 193

Difficulty of producing plain material is still the chief limit to fabricated contracts. More and more do bid openings result in no bids, or possibly but one. In some cases second-hand steel, or that from wrecked buildings, such as the New York world's fair is offered, and usually at full prices. Despite the scarcity of structurals and tendency to honor only defense projects there is still considerable state highway bridge construction, though this is often classified informally as defense work because of the need for mobility for armed forces. Many expect that fourth quarter fabricated sales will be the lightest for the year, partly because of steel scarcity and partly because of the built-up condition of defense plants. Structural and plate trade is in a peculiar situation. Fabricating shops are engaged on work with high rating and are obtaining what they need for the present and immediate future but have no long-term commitments. Yet users of plates with low, or no, priority ratings have long commitments and are unable to obtain material.

The four blast furnaces to be constructed for Republic Steel Corp. are expected to take several thousand tons of fabricated shapes.

SHAPE CONTRACTS PLACED

2700 tons, factory buildings 114, 115 and 70, A. O. Smith Corp., Milwaukee, to Wisconsin Bridge & Iron Co., Milwaukee.

2500 tons, eight gantry cranes for Navy, to Bethlehem Steel Co., Bethlehem, Pa., through Wellman Engineering Corp. and R. W. Kaltenbach Corp.

1400 tons, Rock River bridge, route 2, Sec. 39RF, Grand Detour, Ill., for state, to Bethlehem Steel Co., Bethlehem, Pa.; bids Aug. 29.

700 tons, grade separation bridges, Thirty to Thirty-second avenues, New York, for city, to American Bridge Co., Pittsburgh.

520 tons, paint shop, aircraft manufacturing and assembly plant, Ft. Crook, Nebr., for army, to Omaha Steel Works, Omaha, Neb.

500 tons, building, Bucyrus-Erie Co., Milwaukee, to Worden-Allen Co., Milwaukee.

252 tons, state highway bridge, Grove, Okla., to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.

200 tons, transmission towers, Willamette river crossing, near Portland, Oreg., to Bethlehem Steel Co., San Francisco.

SHAPE CONTRACTS PENDING

3500 tons, supercharger plant, Defense Plant Corp., Milwaukee.

2400 tons, lift bridge, Philadelphia navy yard, Phoenix Bridge Co., Phoenixville, Pa. low.

2200 tons, airplane engine supercharger plant, to be operated by Allis-Chalmers Mfg. Co., Milwaukee, for Defense Plant Corp.; bids Sept. 12.

2000 tons, bridges, Cincinnati, Louisville & Nashville railroad.

1400 tons, optical shop, Frankford arsenal, Philadelphia; Lehigh Structural Steel Co., Allentown, Pa., low.

1034 tons, also 3760 feet steel grid flooring and 95,000 pounds machinery, bridge, Grassy Sound, route S-49, section 5, Wildwood, N. J.; no bids, Sept. 5, Trenton.

1000 tons, plant, Guiberson Diesel Engine Co., Dallas, Texas.

518 tons, three Pennsylvania state bridges; 100 tons, Bradford county; 140 tons, Lancaster county and 278 tons, Wayne county; bids Sept. 12.

403 tons, Hamilton county, Ohio state bridge; Visintine & Son, Columbus, low contractor.

325 tons, spillway bridge, Ft. Loudoun, Lenoir City, Tenn., Tennessee Valley authority.

315 tons, state bridge, Bradford county, Pennsylvania, Phoenix Bridge Co., Phoenixville, Pa. low.

300 tons, coke and ore bins, Interlake Iron Corp., Duluth, Minn.

230 tons, addition to manufacturing building, Lawrence Engineering and Research Corp., Linden, N. J.

210 tons, additions and alterations to Lincoln hospital, New York, for city.

170 tons, railroad underpass, Ft. Sumner, N. Mex., for state.

165 tons, crane bridges, navy yard, Brooklyn, N. Y.

150 tons, state highway bridge LR-136, section 1, TR-222, W. Lampeter township, Pennsylvania.

140 tons, subway repairs, Crawford avenue, Chicago, and various bridges in Iowa, Chicago, Milwaukee, St. Paul & Pacific railroad.

130 tons, pumping station, Rockaway Park, N. Y., for city of New York.

100 tons, three 95-ft. tower assemblies for Coulee power plant; Bethlehem Steel Co., low to Denver.

100 tons, switch towers for Southern

SHAPE AWARDS COMPARED

	Tons
Week ended Sept. 13	8,772
Week ended Sept. 6	12,046
Week ended Aug. 30	5,761
This week, 1940	42,360
Weekly average, 1941	27,728
Weekly average, 1940	21,326
Weekly average, Aug., 1941	15,793
Total to date, 1940	846,597
Total to date, 1941	1,053,667

Includes awards of 100 tons or more.

ROPER Rotary PUMPS

handle any liquid from A to Z

It makes no difference how thin, or how thick the liquid is that you have to pump, a Roper will handle your needs. Any liquid free from abrasives can be pumped with surprising economy and efficiency. Whether used for general transfer or for use on a hydraulic mechanism the new Roper will deliver a smooth, even flow.

Write for Catalog 939 with complete information.

Alcohol	Molasses
Asphalt	Naphtha
Bilgewater	Olive Oil
Boiler Compound	Paints
Catsup	Peanut Butter
Chocolate	Petroleum
Creosote Oil	Quenching Oils
Drugs	Road Oil
Dyes	Rubber Cement
Essential Oils	Shellac
Fruit Syrups	Soap
Fuel Oil	Syrups
Gasoline	Tarvia
Glue	Tomatoes
Hot Lard	Varnish
Ink	Water
Kerosene	Yeast
Lacquer	Zinc Nitrate
Lubricating Oils	

In fact, any liquid free from abrasives.

GEO. D. ROPER CORP., ROCKFORD, ILL.

California Edison Co., Los Angeles, spec. 1541-D; Bethlehem Steel Co., San Francisco, low.

Unstated, eight sliding hangar doors for air station, Kakutat, Alaska; bids to U. S. engineer, Seattle, Sept. 8.

Unstated, substation, Tacoma light department; Ornamental Iron Works, Tacoma, low.

Unstated, two steel frame buildings and five 135-ft. steel towers for radio station, Neah Bay, Wash.; bids to C. A. A., Washington, D. C., Sept. 18.

Unstated, transformer tie downs, portal frames etc. for Units L-4, 5 and 9, Coulee power house; bids to Denver Sept. 18, spec. 1562-D.

Unstated, foundry and pattern shop, 300 x 124 ft., Keyport, Wash., torpedo station; bids to Capt. R. E. Thomas, Puget Sound navy yard, Washington state, Sept. 24.

Unstated, reconstruction west steel truss, Morrison street bridge, Portland, Oreg.; Burkemeier & Saramel, Portland, low $106,583.

Reinforcing Bars

Reinforcing Bar Prices, Page 193

Defense construction, usually ranging from 1000 to 4000 tons, such as for Wright field in Ohio for the former tonnage and Philadelphia navy yard as example of the higher tonnage, lead among current inquiries. Number of inquiries and awards has fallen off sharply, largely because buyers realize the futility of making inquiry. Chicago notes that orders are good but that defense requirements have dropped.

REINFORCING STEEL AWARDS

36,000 tons, Pacific Naval Constructors, Alameda, Calif., for national defense in various parts of the Pacific Ocean, as follows; 14,000 tons, to Columbia Steel Co., San Francisco; 12,000 tons, to Bethlehem Steel Co., San Francisco; 7500 tons to Judson Steel Corp., San Francisco, and 2500 tons to Pacific States Steel Co., San Francisco.

1400 tons, army corps depot, Rome, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

1200 tons, U. S. army supply depot, Marietta, Pa., to Sweet's Steel Co., Williamsport, Pa.; Braun & Stuart, contractors.

1000 tons, steel foundry building, Ford Motor Co., Dearborn, Mich.; Ford furnishes own concrete bars.

300 tons, outfitting building, New York Shipbuilding Corp., Camden, N. J., to Truscon Steel Co., Youngstown, O.; Leonard Shaffer, contractor.

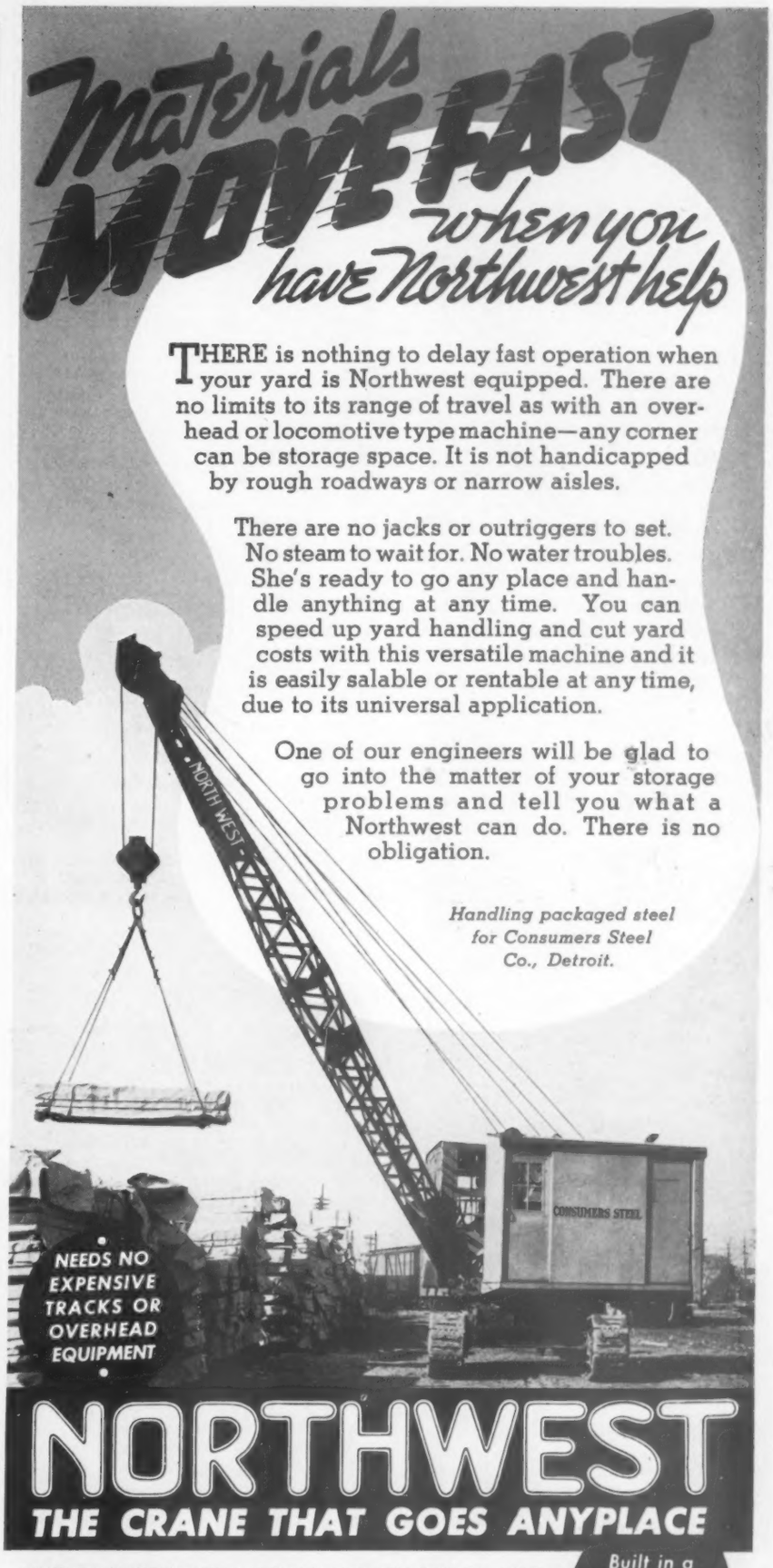
250 tons, additional requirements, Yorktown Mine Depot, Norfolk, Va., to Bethlehem Steel Co., Bethlehem, Pa.; Virginia Engineering Co., contractor.

136 tons, additions, Chicago Screw Co., Chicago, to Ceco Steel Products Corp.,

CONCRETE BARS COMPARED

	Tons
Week ended Sept. 13	40,640
Week ended Sept. 6	25,085
Week ended Aug. 30	7,912
This week, 1940	9,963
Weekly average, 1941	13,454
Weekly average, 1940	8,814
Weekly average, Aug., 1941	14,732
Total to date, 1940	337,371
Total to date, 1941	511,245

Includes awards of 100 tons or more.


Materials MOVE FAST when you have Northwest help
THERE is nothing to delay fast operation when your yard is Northwest equipped. There are no limits to its range of travel as with an overhead or locomotive type machine—any corner can be storage space. It is not handicapped by rough roadways or narrow aisles.
There are no jacks or outriggers to set. No steam to wait for. No water troubles. She's ready to go any place and handle anything at any time. You can speed up yard handling and cut yard costs with this versatile machine and it is easily salable or rentable at any time, due to its universal application.
One of our engineers will be glad to go into the matter of your storage problems and tell you what a Northwest can do. There is no obligation.
Handling packaged steel for Consumers Steel Co., Detroit.
NORTH WEST
CONSUMERS STEEL
NEEDS NO EXPENSIVE TRACKS OR OVERHEAD EQUIPMENT
NORTHWEST
THE CRANE THAT GOES ANYPLACE
NORTHWEST ENGINEERING CO.
1805 Steger Building • 28 East Jackson Boulevard
Chicago, Illinois
Built in a range of 18 sizes—4½ to 40 tons capacity

Chicago.

126 tons, warehouse, Sault Ste. Marie, Mich., for government, to Truscon Steel Co., Youngstown, O.

115 tons, manufacturing building, Chevrolet Motor Co., Bay City, Mich., to Truscon Steel Co., Youngstown, O.; Henry C. Weber Construction Co., contractor.

113 tons, residence hall, Saint Norbert's College, West Depere, Wis., to Ceco Steel Products Co., Milwaukee.

REINFORCING STEEL PENDING

4400 tons, smokeless powder plant, Terra Haute, Ind.

4000 tons, warehouse superstructure, Philadelphia navy yard; Turner Construction Co., New York, low on one general contract and J. J. McCloskey & Co., Philadelphia, low on another.

2000 tons, pier and warehouse, quartermaster depot, Seattle; General Construction Co., Seattle, low $1,944,000, complete; Macri Bros. and S. S. Mullen, Seattle, combined low bid $1,539,037 for pier only.

1600 tons, United States engineer office, South Pacific division, San Francisco; bids opened.

1500 tons, plant, Aluminum Co. of America, Massena, N. Y.

1000 tons, building, Wright field, Dayton, O., through National Concrete & Fireproofing Co.

700 tons, Battery-Brooklyn tunnel, New York, contract 7.

654 tons, wire mesh, Bureau of Reclamation inv. C 42220-A-1, Mecca, Calif.; Colorado Fuel & Iron Co., Pueblo, Colo. submitted only bid and for half of the tonnage.

600 tons, four buildings, Rath Packing Co., Waterlow, Wis.

600 tons, cantonment, Camp Barling, Little Rock, Ark.

500 tons, Frances Cabrini Homes project, Chicago, for Chicago Housing Authority; bids deferred from Sept. 9 to Sept. 30.

470 tons ,defense products plant, Westinghouse Electric & Mfg. Co., Lester, Pa.

450 tons, warehouse, Hecht Co., Washington, D. C.

348 tons, Bureau of Reclamation, inv. 24851-A, Araby, Ariz.; bids opened.

300 tons, grain bins, Maroa, Ill.

300 tons, building, Pepsi Cola Co., Long Island City, Long Island, N. Y.

300 tons, boiler house, naval training station, Newport, R. I.; Ford, Bacon & Davis, contractors.

300 tons, plant and offices, American Can Co., St. Louis; Norris Construction Co., contractor.

270 tons, addition, Marquette Cement Co., Des Moines, Iowa; bids in.

240 tons, building, Champion Machine & Forge Co., Cleveland.

200 tons, building, Consolidated Power & Paper Co., Dancy, Wis.

200 tons, plant, Stupakoff Mfg. Co., Latrobe, Pa.

150 tons, airplane engine plant, Milwaukee.

150 tons, Bureau of Reclamation, inv. 38028-A, Odair, Wash.; bids opened.

140 tons, including 73 tons, balance, mesh paving, Lafayette, Ind. for state; Calumet Paving Co., contractor.

100 tons, plant, National Rivet Co., Waupon, Wis.

100 tons, Entiat river county bridge, Wenatchee, Wash.; Roy L. Blair, Spokane, Wash., contractor.

Unstated, approaches, retaining walls, etc., Morrison street bridge, Portland, Oreg.; Burkemeier & Saramel, Portland, low $106,583.

SAVE PLATERS TIME!

UNICHROME* "AIR DRY" RACK COATING

Stands up longer—needs less frequent recoating

Announced four months ago, the timely value of Unichrome "Air Dry" Rack Coating continues to make news in the plating industry. Enthusiastic users adopt Unichrome "Air Dry" as standard procedure after a trial application—because of its convenient and extra service-life features.

No dipping or force drying is necessary—you can produce the toughest, most resistant coating you ever saw, right in your own shop. Shipping containers can be used for dipping. The material is applied and dried at room temperature.

Here are the seven big time- and money-saving advantages at a glance:

INSOLUBLE—withstands hot cleaners and all plating solutions

SAFE—contains no ingredients harmful to plating solutions

TOUGH—withstands wear and tear of handling

FLEXIBLE—withstands repeated flexing and bending

DURABLE—reduces the need for recoating

CONVENIENT—any part can be patched without recoating the entire rack

EASILY APPLIED—dipping is done in the container in which it is shipped—the material dries at room temperature.

Address requests for further information or a trial order to the nearest office below.

UNITED CHROMIUM
INCORPORATED
51 East 42nd Street, New York, N.Y.
2751 E. Jefferson Ave., Detroit, Mich.
Waterbury, Conn.

*Trade Mark Reg. U.S. Pat. Off.

Unstated, foundry, pattern shop and other building, Keyport torpedo station, Washington state; bids to Capt. R. E. Thomas, Puget Sound navy yard, Sept. 24.

Semifinished Steel

Semifinished Prices, Page 193

Orders for semifinished steel are being placed by the Treasury Procurement division to maintain steady shipments to Great Britain at a rate of 250,000 to 300,000 tons per quarter. Practically all this goes to the British Isles, with a small portion for South Africa and some small lots of skelp for India.

Shortage of semifinished continues and operations of finishing mills are handicapped in many instances by lack of their raw material.

Pig Iron

Pig Iron Prices, Page 194

Pig iron shipping instructions by OPM were received by makers early last week and were said to cover 4,500,000 tons of iron, approximately full September production. In general it would appear that little iron will be available for melters on priorities under A-9. Foundries with ratings lower than this are faced with suspension unless they can obtain defense work, the situation being complicated by shortage of scrap, particularly cast grades.

In some districts allocations were close to estimates filed by melters, while in others they were cut sharply, in some cases to half the requested tonnage. Apparent irregularities appeared, some melters with low rating being allocated tonnage while some with higher priority were given little. The New England furnace has been given some tonnage for Great Britain and some to be shipped to Eastern Pennsylvania.

Suppliers were in a hard position during the first week of September as they had no orders to ship iron, while melters were in need to continue operations. Some furnaces made no shipments during that period, while others supplied some iron in high priority users. Furnaces were slow to pile iron on yards while awaiting the September allocations, as this adds to expense of production.

A result of the September allocation is to show that pig iron melters henceforth must operate on a hand-to-mouth basis and will not be allowed to accumulate any iron in stocks. Iron will be made available only in proportion to defense need and lower preference ratings will be given little opportunity to obtain supply. Stocks in hands of users will be drawn down during succeeding months, as a result of the effort to spread available supply as widely as possible for defense.

Tin Plate

Tin Plate Prices, Page 192

Conditions in tin plate run fairly smoothly, though producers pre-

"Six months' continuous 24-hour per day service with only three hours out during that time for any mechanical failure." This company has ten Flexomotives. Think it over. Want to know some more about "the record"? There's a Plymouth Flexomotive working near you.

PLYMOUTH LOCOMOTIVE WORKS
DIVISION OF THE FATE-ROOT-HEATH COMPANY
PLYMOUTH, OHIO

PLYMOUTH Flexomotive
DOLLAR FOR DOLLAR
THE GREATEST DIESEL LOCOMOTIVE EVER BUILT

IF GOVERNMENT DEFENSE ORDERS
(OR YOUR REGULAR PRODUCTION)
REQUIRE UNUSUALLY
CLOSE TOLERANCES

Investigate JESSOP
"RAPID FINISHING" Tool Steel

Precise dimensions on machined parts call for a tool steel that will hold a keen, hard cutting edge during long runs. Such a steel is Jessop's RAPID FINISHING, which, because of its superior wear resistance, is widely used in forming tools for automatic machine work, precision tools, boring tools, and other tools for fast finishing cuts on aluminum, magnesium alloys, brass, and other metals. Jessop's RAPID FINISHING tool steel characteristically produces the smooth, clean surface so often required in armament production.

RAPID FINISHING is a high carbon-tungsten-chromium steel which costs approximately 40% less than high speed steel. Write today for descriptive Bulletin 541.

JESSOP STEEL CO. FINE JESSOP STEELS WASHINGTON, PA.

JESSOP STEELS OF AMERICA
JESSOP STEEL COMPANY
General Offices and Works
WASHINGTON, PENNA. U.S.A.
CARBON · HIGH SPEED · SPECIAL ALLOY
STAINLESS and COMPOSITE STEELS

Speed up SAND BLASTING

Ruemelin Sand Blast Cabinets put blast cleaning operations on a faster, more efficient basis. Simple to operate. No skilled labor needed. Built for long, continuous trouble-free service. Use sand or steel abrasives. Dustless! Hygienic!
Write for New Catalog 32-A Just Off the Press
RUEMELIN MFG. COMPANY
3882 N. Palmer St. Milwaukee, Wis.

RUEMELIN *Blast Cleaning Cabinets*

dict that civilians will find supplies continuously tighter over the next few months, especially in the luxury field, such as ornamental cans for fancy packaging. In many cases manufacturers who can classify in the defense group take pains to get priority ratings as insurance. An increasing quantity goes into so-called defense, though with some whimsical applications. Considerable tin plate goes into cans for "harness oil," despite the mechanized character of the cavalry and other service branches. Soldiers' rations also take considerable quantities.

Crops for canning this season have been large, in some instances records, in vegetables, fruits or fish. Moreover, in many cases because of early maturing of crops canners ordered their supplies by rush call a month in advance of normal. Tin plate production continues at full practical capacity. Considerable plate is being used to transport oil and its products to Russia.

Scrap

Scrap Prices, Page 196

Trading in scrap is at a relative standstill as a result of imposition of price ceilings, after their breakdown last month. Efforts to deliver tonnage before the deadline resulted in yards clearing practically all accumulations and further flow has been slow. Practically the only offerings at present are from railroads and these are much less than normal.

As a result of the shortage, with melters in dire need, especially foundries, many of whom have had their pig iron supply cut down by OPM allocation, it is reported price irregularities are beginning to appear, especially in the East. It is believed by some observers that the ceiling will not be more effective than previously. Some large steel mills adhering closely to announced maximum prices even if it means production curtailment. It is reported a Canadian user has placed an order for a moderate tonnage of steel scrap in this country at about $7 above the domestic ceiling.

It is estimated that scrap movement is well under 50 per cent of the August rate. While no system of priorities has been estab-

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten types

For each 1% tungsten contained	
Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium	13.50
Turnings, millings, same basis	11.50

lished, this is expected to be done in an effort to give better distribution. The current accumulation of scrap at the Philadelphia navy yard is said to have been awarded a consumer in that district on specific instructions from Washington and other somewhat similar instances, involving direct shipments of scrap from producer to consumer, are indicated.

In the St. Louis district it is reported rejections have been made recently by steel mills, on the ground that material is for below grade and cannot be used for steelmaking. Granite City Pig Iron Co., which plans to blow in a stack about Oct. 1, is in the market for busheling, turnings and other blast furnace grades. This is the first time in many years there has been a market for this material in the St. Louis district.

Some steelmakers have been able to make barter agreements with buyers of their steel, by which scrap resulting from its use is returned to the mill. This action does not increase actual supply but gives the steelmaker a definite source for some material. Apparently direct dealings are on the increase, thus restricting the volume passing through the hands of brokers. This applies only to industrial scrap and railroad material.

When bids from scrap dealers on 240 tons of street car rails owned by the city of Cleveland were opened last week all bidders turned in an identical base price of $21.50 per ton, though various individual clauses made the ultimate price somewhat different, based on cost of collecting the rails from the streets.

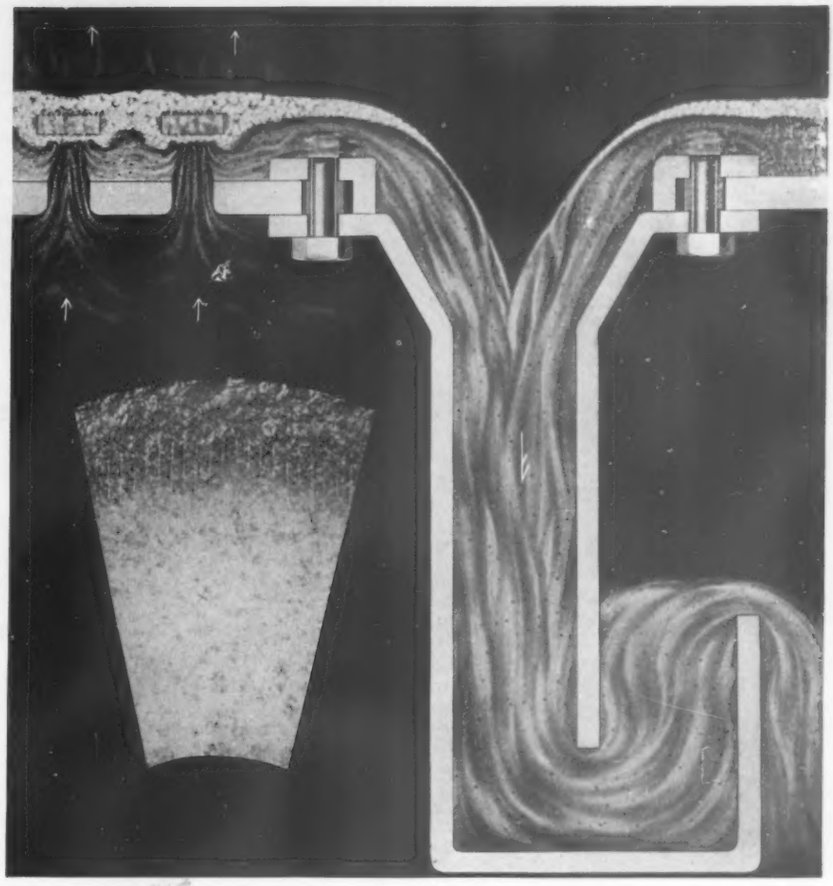
Pacific Coast

Seattle—Defense projects are taxing capacity of rolling mills and fabricating shops, backlogs showing little change. No new business is accepted except upon approval of government agencies.

As soon as the new priority order affecting warehouses functions the jobbing situation will be relieved and small buyers engaged in public work will be able to increase production. The lumber industry in the Northwest is also asking for relief, claiming that under present conditions, there is a bottleneck that handicaps them in obtaining machinery and equipment for repairs and replacement, this condition slowing up production of forest items essential in the national program. Saw mills, dry kilns, planing mills and loggers requiring wire rope and machinery are joining in a protest that they are unable to operate at full capacity.

Warehouses report August registered record high volume of sales. All items are in strong demand, sheets, plates, bars and shapes leading. Stocks are exceptionally low. All deliveries are now by rail and are still slow and uncertain.

The scrap market continues confused and uncertain. Official threats



Look Inside . . . a . . .

PEABODY GAS SCRUBBER

THE main illustration shows a section of the Peabody Plate and adjoining water drain. The inset shows a segment of the Peabody Impingement Baffle Plate in action.

Intensive cleaning action results from the impact of high velocity gas jets upon the underside of submerged baffles located over each plate perforation. Entrained solids are driven against the wet baffles and become permanently trapped in the scrubbing water.

Violent water circulation over the entire plate surface is continuous as the gas jets pull water upward toward the baffles, causing an equivalent water downflow to the plate midway between the perforations.

As water is supplied to the plate an equal quantity flows over the weir strips into the drain trough and out through the water seal, falling to the plate stage next below.

Water cannot pass downward through the plate perforations against the gas flow—hence all water leaves the plate through the big drain troughs and water seals.

Use Peabody Scrubbers for new gas cleaning projects or Peabody equipment to step up performance of existing washers.

PEABODY ENGINEERING CORPORATION
580 FIFTH AVENUE • NEW YORK
OFFICES IN PRINCIPAL CITIES

to bear down have temporarily halted the movement of materials until the situation is clarified. Scarcity of certain grades has resulted in more liberal specifications and other expedients to obtain material. Rolling mills report they still have large inventories but receipts are less than the market can consume. Foundries particularly are in a quandary as cast iron is scarce.

Demand for cast iron pipe is active but agencies show little interest, due to difficulties of delivery. Many municipal projects are being postponed until the defense program is completed.

Warehouse

Warehouse Prices, Page 195

While some warehousemen reserve their opinion of the new M-21-B ruling on steel supplies, most of them believe their position has been strengthened. A rating of A-9 is well down on the list and difficulties will be met in obtaining plates, bars and galvanized sheets. However, replacement of other products will be expedited and where distributors have high priorities on special defense jobs, they will be able to take advantage of them. However, Washington points out that these special jobs must be included in regular allotments and not added to them.

It is also indicated that mill seconds and other off grades must be subtracted from the total allowed the warehouse. As a result it appears likely little of these grades will be bought, imposing a problem on mills for their disposition. This raises a matter for further adjustment.

Some pipe distributors complain that use of first quarter deliveries as a basis for current and fourth quarter quotas is not fair, as first quarter business is much less than in the fall and that allocations will be smaller than needed. Washington has pointed out that pipe distributors' stocks this year are much heavier than a year ago. Washington claims, according to one report, they are double those of last year, although admitting that stocks may be unbalanced and that on certain popular sizes supplies may be smaller than a year ago.

Ferroalloys

Ferroalloy Prices, Page 194

In line with general avances in chrome allovs for fourth quarter, one large seller, in addition to a 2-cent increase in ferrochrome, has announced for next period a ¾-cent increase in his brand of chrome foundry alloys.

Ferrochrome briquets will be raised 1¼ cents per pound.

The increases apply uniformlv to the various order quantities. The higher prices result from additional costs incurred through advancing water transportation rates, war risk insurance and increased labor and material charges.

Among leading ferroallovs now being reaffirmed are ferromanganese, ferrosilicon, spiegeleisen, ferrovanadium, ferrotitanium and alsifer.

Steel in Europe

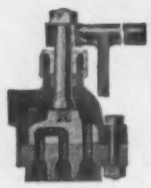
Foreign Steel Prices, Page 195

London — (*By Cable*) — Renewed war contract activity is noted in many departments of the steel industry in Great Britain, especially in alloy steels. Shipbuilding steel, boiler plates, pig iron and semi-finished supplies are satisfactory. Coke supply is sufficient but export has almost stopped. Demand for scrap is increasing. Tin plate market is quiet.

Metallurgical Coke

Coke Prices, Page 193

Fears of coke shortage have disappeared and ample fuel is available as a result of high beehive production. Some 8000 beehive ovens are active in the Connellsville region, with output of 480 000 tons per month. Other ovens might be repaired and pressed into service if needed to supply additional coke for the enlarged blast furnace capacity planned bv OPM. Higher costs would be involved as most ovens requiring onlv moderate repairs have been placed in service.

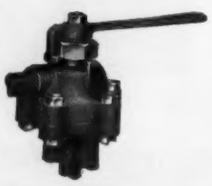


3-WAY VALVES
FOR OPEN HEARTH FURNACES
By NICHOLSON

It answers a long-felt need among open hearth operators, because it alternates the flow of oil and steam to the oil burners on the furnaces without showing signs of leakage or wear. For use on air, steam, water or oil up to 300 lb. pressures, this valve can't be surpassed. Our catalog No. 140 carries concise descriptions of this and other valves: foot, solenoid and motor operated. Catalog on request.

PRESSURE-TIGHT SERVICE AT LOW COST

The Nicholson lever-operated style J valve for air or oil pressures up to 125 lbs. was introduced to meet the demand for a low-priced valve. Least expensive of the Nicholson valves, it gives the same trouble-free service that the larger and more expensive valves do. It, too, is described in our catalog No. 140.



OTHER NICHOLSON PRODUCTS:
Nicholson welded floats, piston and weight operated traps. Flexible couplings, expanding mandrels, arbor presses, compression shaft couplings, steam eliminators and separators. Compressed air traps.

W. H. NICHOLSON & COMPANY
177 OREGON ST., WILKES-BARRE, PA.

SHENANGO-PENN
INGOT S M P Co. MOLDS
STOOLS
SHENANGO-PENN MOLD COMPANY
Oliver Bldg., Pittsburgh, Pa.
Plants—Sharpsville, Pa. and Neville Island, Pa.
(Rail and River Shipments)

Nonferrous Metal Prices

Sept.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
2-12	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	7.25	17.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	12.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.00-10.25
Cleveland	10.00-10.25
Chicago	9.25-9.50
St. Louis	9.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.25

Light Copper

New York	8.00
Cleveland	8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	5.50-5.75
Chicago	5.75-6.00
St. Louis	5.75-6.00

Lead

New York	5.00-5.25
Cleveland	4.75-5.00
Chicago	4.75-5.00
St. Louis	4.50-4.75

Old Zinc

New York	4.50
Cleveland	4.00-4.12½
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

Nonferrous Metals

New York—Availability of supplies is still the controlling factor in metal consumption which is being concentrated to an increasing degree on defense requirements.

Copper—Divisions of some brass mills have been forced to shut down due to shortage of raw materials. OPM estimates September copper supplies at 131,000 tons against 117,262 tons actually shipped in August and 143,089 in July.

Lead—Consumers are to notify the Tin-Lead branch of OPM by Sept. 18 how much lead they will need from the Metals Reserve Co. next month. Since supplies have not increased materially, consumption holds steady.

Zinc—Supply situation has improved slightly and consumption is increasing gradually. The allocation program is working smoothly.

Tin—Far Eastern tin prices have increased to the equivalent of about 51.95c which does not leave sufficient margin under the domestic 52-cent maximum price to permit importers to buy in that market. Supplies in this country are adequate for present needs, however, since consumers have requested MRC to supply less than 150 tons for prompt delivery.

Whiting Corp., Harvey, Ill., has opened a new office at 6381 Hollywood boulevard, Los Angeles, to provide engineering and sales service on its aviation products. Evert C. Hokanson has been named manager of the office.

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O. K. SLITTERS give smoother, more efficient, longer runs with more hours between grindings. Exact metallurgical specifications and electrically controlled furnaces give uniform hardness and temper to each knife. Uniformly exact dimensions, obtained by the latest grinding equipment, give smoother trims. For the knives with the longer lives that give better results at lower costs, specify O. K. SLITTERS.

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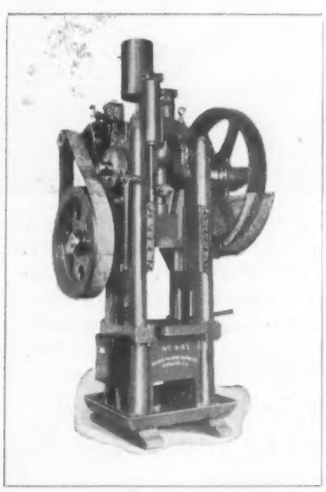

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Canada

Toronto, Ont. — More drastic action is under consideration directed toward curtailment of iron and steel supply for non-essential industry, with the object of providing larger quantities of war materials. Confirming a forecast made in July, C. D. Howe, minister of munitions and supply, announced this week an order-in-council curtailing production of passenger automobiles for sale in Canada in 1942 to approximately 44 per cent of the 1940 figure. Under the new order-in-council, the motor vehicles controller reserves the right, on three months' notice to manufacturers, or on shorter notice if deemed sufficient in the circumstances, to restrict or prohibit the production of automobiles, or to vary or amend the production quota.

Orders and inquiries appearing in the market for steel are widely diversified and involve tonnages well in excess of Canadian capacity. More rigid priority rulings were announced during the week by the Canadian steel controller and restrictions were placed on the sale of materials held in warehouses.

Sharp increase in demand for plates is indicated with announcement of award of new shipbuilding contracts totaling approximately $40,000,000.

While inquiries for sheets and strip are numerous, mill representatives state they are not accepting much in new orders. Books are filled to the end of the year, and producers are permitted to take on additional contracts only on the approval of the steel controller.

Merchant bar sales are reported, but only under the supervision of the government. Inquiries are heavy and Canadian mills now report that practically all production for the remainder of this year is under contract. As a result only a few odd sizes are available to consumers, with war contractors receiving preferential delivery.

Structural steel lettings continue at record breaking pace, with practically all new business directly for war effort. The most important award in the past week, in fact a record award for this country, was some 45,000 tons to Dominion Bridge Co., Lachine, Que., from the federal government. Awards for the week, mostly ranging from 50 to 600 tons, totaled about 55,000 tons.

While inquiries for foundry and malleable pig iron are numerous, it is stated that only a small portion of demand is being filled, with no iron available for non-essential industry. The steel controller is maintaining strict supervision over all new orders for merchant iron and only those directly associated with war effort are being approved.

Orders for scrap are pouring in at a rate that greatly surpasses supply and consumers are turning to any possible source for supplies. Dealers are meeting most demands for steel scrap, but report shortage of cast grades and stove plate, with no indication that there will be easier conditions as long as the war lasts.

Critical Metals Saved By Auto Producers

(*Concluded from Page* 31)

reason for the use of alloys, such as nickel, chromium, and over 1 per cent manganese, is to make steels which will harden properly when used in heavy sections. The high strength we need in steel is obtained by hardening it.

Plain carbon steel hardened and properly tempered is just as good as alloy steel in many cases, a valve spring for example. But, in a part like a steering knuckle or a transmission gear cluster, a carbon steel will not harden properly because heavy pieces like these parts will not cool fast enough when quenched in oil or even in water. If we were restricted entirely to plain carbon steels, we would indeed be in a tight spot.

Hardness is synonymous with strength. An alloy steel and a plain carbon steel of the same hardness will have the same strength or load carrying ability. It is clear, therefore, that since plain carbon steel will not harden in the majority of the important parts of an automobile, the need is for steels that will harden properly even though denied the use of nickel, chromium, and more than 1 per cent manganese. And that is exactly what we have. Thanks to increased knowledge of alloys, we can duplicate the hardening power of any of the present highly alloyed chromium-nickel-manganese steels without the use of these elements excepting the amount of manganese ordinarily used in plain carbon steel.

Hardening Alloys Available

We have left to use: Up to 1 per cent manganese; we have molybdenum, a purely domestic metal not on priority; we have silicon, also not on priority and plentifully abundant in the earth's crust, and we have some highly specialized deoxidizing and nitrogen fixing alloys which, used in small quantities, exert a tremendous influence on hardening power.

These deoxidizing and nitrogen fixing agents are various combinations of titanium, zirconium, aluminum, vanadium and calcium. Although aluminum and vanadium are both on priority, the quantities used for this purpose are so small and so important that it is believed they will be available to the steel industry for this purpose.

(Ed. Note: Mr. McCuen here refers to development by GM metallurgists of a new series of steels known by the name Mo-man-sil—high-silicon steels with small amounts of molybdenum and manganese. Some steel companies have produced pilot heats (about 30 tons) of this material for General Motors, but there has been hesitancy in taking on any large production, for the reason that in basic open-hearth practice silicon must be incorporated in the metal as a ladle addition, since in the basic furnace it would be absorbed into the slag. However, should any restriction be placed on use of manganese, it is likely Mo-man-sil steels would come into use prominently, for like Chrysler's Amola steels, they offer the

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advantage of high performance with low alloying.)

In the field of plastics there are many possible uses. We already are using it in a great many ways. New this year are complete interior door handles, built around suitable steel reinforcements. We can look forward to a gradually expanding field of usefulness for plastics over the years, but it will not come as rapidly as some people would have us believe.

When we are privileged to introduce our next new models, whether it be in 1944 or 1945, which, of course, can be anybody's guess, there will be many changes. The use of plastics will be increased. Aluminum will be fighting it out with steel for position. Increased use of rubber, natural and synthetic, is bound to come. One hundred-octane fuel will be a general thing after the war, bringing more power with greater economy. Synthetic materials will be in more general use. Nothing can stop progress. It may be slowed up slightly but it cannot be stopped. We will learn many things from this emergency both about materials and manufacturing; all of which should and will be reflected in better products and better values.

Priority Granted For Repair Parts

(*Continued from Page* 36)

voted principally to pleasure craft).

(xx) Telephone and telegraph communication.

(2) "Material" means any commodity, equipment, accessories, parts, assemblies, or products of any kind.

(3) "Repairs" means only repairs needed because of an actual or imminent breakdown, from whatever cause, of a Producer's property or equipment.

(4) "Emergency Inventory" means minimum inventory of Material required to provide for Repairs to meet an actual or imminent breakdown, from whatever cause, of a Producer's property or equipment.

(5) "Supplier" means any person with whom a purchase order or contract has been placed by a Producer or any Supplier for

(i) Material to be used for Repairs;

(ii) Material required for a Producer's Emergency Inventory;

(iii) Material to be physically incorporated in other Material which is to be used for Repairs or which is required for a Producer's Emergency Inventory.

(b) Assignment of Preference Rating. Subject to the terms of this Order, Preference Rating A-10 is hereby assigned

(1) to deliveries to a Producer of Material required by him for Repairs or for his Emergency Inventory;

(2) to deliveries to a Supplier of Material which is, in turn, to be delivered to a Producer for Repairs or for his Emergency Inventory or to be physically incorporated in Material to be so delivered.

(c) Persons Entitled to Apply Preference Rating. The preference rating hereby assigned may be applied by

(1) a Producer;

(2) a Supplier, provided that he requires the Material so purchased in order to make deliveries duly rated pursuant to paragraph (b).

(d) Application of Preference Rating.

(1) A Producer in order to apply the preference rating to a delivery of material to him must endorse the following statement on the original and all copies of the purchase order or contract for such Material signed by a responsible official duly designated for such purpose by such Producer.

"Purchase Order for Repair or

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MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

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1213 First National Bank Building

Emergency Inventory-Preference Rating A-10 under Preference Rating Order P-22."

Such endorsement shall constitute a certification to the Office of Production Management that such Material is required for the purposes stated therein. Any such purchase order or contract shall be restricted to material the delivery of which is rated in accordance herewith.

(2) A Supplier in order to apply the preference rating to a delivery of Material to him must endorse the following statement on the original and all copies of the purchase order or contract for such Material signed by a responsible official duly designated for such purpose by such Supplier:

"Purchase Order for Material required to fill a duly rated order for Repair or Emergency Inventory. This purchase order bears Preference Rating A-10 under Preference Rating Order P-22".

Such endorsement shall constitute a certification to the Office of Production Management that such Material is required to fill an order placed by a Producer or Supplier duly rated in accordance herewith. Any such Supplier's purchase order or contract shall be restricted to Material the delivery of which is rated in accordance herewith.

(3) A Producer or Supplier placing any such rated purchase orders or contracts and the Supplier selling the Material covered thereby, must each retail endorsed copies of such purchase orders or contracts segregated from all other purchase orders or contracts for a period of two years from the date thereof for inspection by authorized representatives of the Office of Production Management.

(e) Restrictions on Application of Rating. The Preference Rating hereby assigned shall not be applied

(1) by a Producer to obtain Material in excess of his requirements for Repairs or for his Emergency Inventory;

(2) unless the Material to be delivered cannot be obtained when required without such rating;

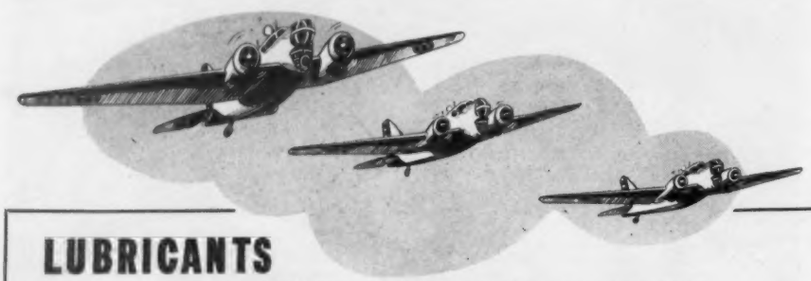
(3) by a Supplier to obtain Material in excess of the amount necessary to make rated deliveries.

(f) False Statements and Penalties. Any person who applies the preference rating hereby assigned in wilful violation of the terms and provisions of this Order, or wilfully falsifies records required to be kept or information to be furnished pursuant to this Order, or who obtains a delivery of Material by means of a material and wilful misstatement will be prohibited from further applying said rating. Such person may also be prohibited from obtaining further deliveries of Material under allocation and be deprived of any other priorities assistance. The Director of Priorities may also take any other action deemed appropirate, including the making of a recommendation for prosecution under Section 35A of the Criminal Code (18 U. S. C. 80).

(g) Revocation or Modification. This Order may be revoked or amended by the Director of Priorities at any time in whole or in part or in its application to any Producer or any Supplier. In the event of revocation, or upon expiration of this Order, deliveries already rated pursuant to this Order shall be completed in accordance with said rating, unless the rating has been specifically revoked. No additional applications of this rating to any other deliveries shall thereafter be made by any Producer or Supplier affected by said revocation or expiration.

(h) Effective Date. This Order shall take effect on the 9th day of September, 1941, and unless sooner revoked shall expire on the 28th day of February, 1942.

Donald M. Nelson,
Director of Priorities



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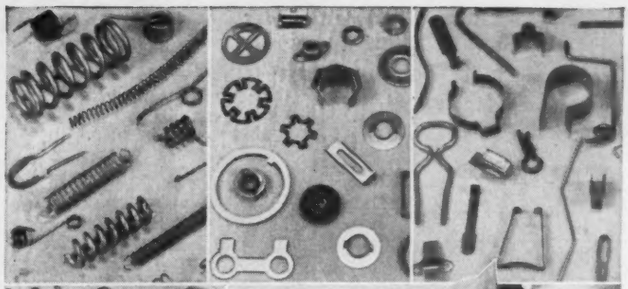

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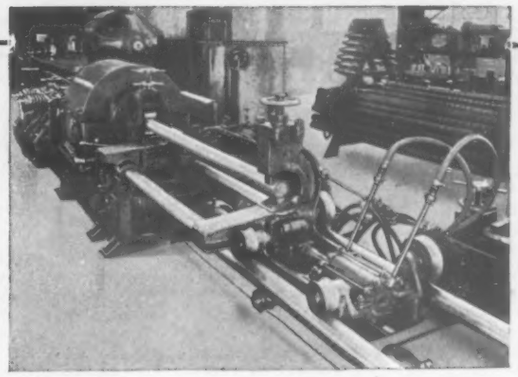

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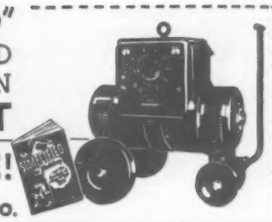

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Construction and Enterprise

Ohio

CANTON, O.—Bowdil Co., 800 Waynesburg road, foundry and machine shop products, is adding 4800 square feet to plant at cost of $8000. Heat treating facilities will be enlarged and some additional equipment installed.

CINCINNATI—Alvey-Ferguson Co. is building an addition covering 6400 square feet, to be used for manufacture of washers. This will make entire main plant available for productioin of conveyor systems, largely for defense.

CLEVELAND—S. K. Wellman Co., 1361 East Forty-ninth street, manufacturer of brake linings and clutch facings, will receive bids Sept. 16 through C. B. Rowley & Associates, architects, Keith building, for a plant addition.

CLEVELAND—Jordan Welding & Mfg. Co., 9428 Cassius avenue, has two buildings under consideration for lease to increase manufacturing facilities. William Jordan is president.

CLEVELAND—Champion Machine & Forging Co., H. W. Foster, president, 3695 East Seventy-eighth street, will let contract soon for a one-story 145 x 400-foot forge shop and a one and two-story machine shop and office building, 60 x 100 feet, to cost about $450,000. E. R. McGeorge and W. R. Hargett, 9400 Quincy avenue, are engineers.

CLEVELAND—Mid-West Forge Co., Robert I. Gales, president, 17301 St. Clair avenue, will build transformer building costing $10,000.

CLEVELAND—Cleveland Cap Screw Co., 2917 East Seventy-ninth street, J. W. Fribley, president, will build a storage building 131 x 200 feet, contract to be awarded soon.

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 200 and Reinforcing Bars Pending on page 202 in this issue.

COLUMBIANA, O.—Columbiana Boiler Co. will take bids soon on a 60 x 210-foot plant to cost over $50,000.

ELYRIA, O.—Elyria Foundry Co., Filbert street, subsidiary of Industrial Brownhoist Co., Bay City, Mich., will build 13,000-square foot castings cleaning building. Contracts will be let soon by W. S. Golmar, general manager.

HAMILTON, O.—Herring-Hall-Marvin Safe Co., Grand boulevard, will build a one-story plant addition, contract to Antenen Engineering Co., Hamilton, O., to cost about $108,000. (Noted Aug. 18.)

KENT, O.—C. L. Gougler Machine Shop, 789 Stow road, will build another plant addition, to cost about $10,000. George Beckwith is general manager. Several additions have been built in past year.

NEW PHILADELPHIA, O.—Plant and equipment of Precision Mfg. & Engineering Co. has been leased by Barium Stainless Steel Corp., 1502 Allen avenue S. E., Canton, O., and some new equipment will be installed. Will be used for production of metal links for machine gun bullets, for which large contract has been taken.

Connecticut

MIDDLETOWN, CONN.—Public works department plans a high-pressure water line from Mt. Higby reservoir, to cost $500,000, and new mains and fire protection to cost $100,000.

STAMFORD, CONN.—Electric Specialty Co., 211 South street, is having plans made for a one-story plant addition to cost over $40,000.

Maine

SOUTH PORTLAND, ME. — United States Maritime Commission, Fourteenth and Constitution avenue, Washington, has let two shipways, shops etc., to South Portland Shipbuilding Co., to cost about $2,000,000.

Massachusetts

EVERETT, MASS.—Barwood Mfg. Co. Inc., Williams street, has let contract for a one-story 52 x 164-foot manufacturing building at Williams and Norman streets, to James Sheppard, 225 Vine street, at estimated cost of $40,000.

New York

BLASDELL, N. Y.—Exolon Co., D. M. Ramsey, manager, abrasive manufacturer, will rebuild its burned plant at cost of $100,000.

LIVERPOOL, N. Y.—Air-Cooled Mo-

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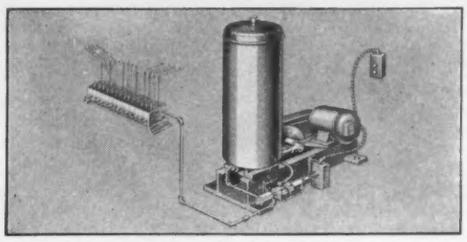

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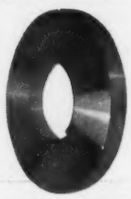

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M-272

IN THE CENTER OF MID-TOWN NEW YORK

tors Corp., Liverpool road, will build a 66 x 160-foot plant, contract to Conlon & Farnsworth, State Tower building, Syracuse, N. Y., costing about $40,000. L. M. Cook, 250 Whittier avenue, Syracuse, N. Y., is engineer.

NORTH TONAWANDA, N. Y.—National Grinding Wheel Co. Inc., J. Russ, president, will build a two-story 40 x 122-foot plant costing $40,000. Contract has been let to Laur & Mack Contracting Co., 1400 College avenue, Niagara Falls, N. Y.

New Jersey

NORTH CALDWELL, N. J.—City plans construction of waterworks system costing about $50,000. J. C. Harding, 15 Park place, New York, is engineer.

TRENTON, N. J.—Thermoid Co. has let contract for 100 x 200-foot plant addition, to cost about $75,000.

Pennsylvania

BRISTOL, PA.—Fleetwing Inc., airplane manufacturer, has let contract to Eastern Construction Co., Trenton, for $468,520 for erection of three buildings, 218 x 528 feet, 93 x 162 feet and 60 x 60 feet. Other contracts will be let later, including windowless plant for Defense Plant Corp., costing $2,800,000.

Michigan

DEARBORN, MICH.—Dearborn Tool & Die Co. is having plans made by Arthur Des Rosiers, architect, Detroit, for an office building.

DETROIT—Amy Tool & Grinding Shop Inc. has been incorporated with $10,000 capital to deal in lathe work and tool grinding, by Joseph A. Amy, 9102 French road, Detroit.

DETROIT—Wayne Gasket Co., 7442 Fourteenth avenue, has been incorporated with $10,000 to manufacture gaskets, steel rules and dies, by Roy L. Neveau, 10270 Prairie avenue.

DETROIT—Reliance Foundry Co., 1933 Macomb street, has been incorporated with 1250 shares no par value, to operate a foundry, by Howard Neuman, 4324 Fifth street, Ecorse, Mich.

DETROIT—Fruehauf Trailer Co., 10940 Harper avenue, plans a plant addition costing $100,000. Richard F. Marr, 514 Brainerd street, is architect.

PLYMOUTH, MICH.—Burroughs Adding Machine Co. has let contract to Esslinger-Misch Co., Detroit, for a plant addition. (Noted Aug. 18.)

RIVER ROUGE, MICH.—Ford Motor Co., Dearborn, Mich., will build a four-story 360 x 400-foot aircraft plant addition; contract to Esslinger-Misch Co., 159 East Columbia street, Detroit.

SAGINAW, MICH.—Saginaw Malleable Iron division of General Motors Corp. has let contract for a 1-story foundry addition costing $50,000 to Austin Co., 429 Curtis avenue, Detroit.

SAULT STE. MARIE, MICH.—Cloverland Electric Co-operative, Harvey E. Kappahahn, manager, has let contract to Honold & LePage, Sheboygan, Mich., for $107,777 for 142 miles rural transmission line to serve 422 customers. J. & G. Daverman, Grand Rapids, Mich., are engineers.

YPSILANTI, MICH.—City will build a 100 x 200-foot sewage disposal plant to cost about $300,000. Contract has been given to Course & Sanders, 12740 Lyndon street, Detroit.

Illinois

CARBONDALE, ILL.—War department will start construction at once of its $40,000,000 shell and bomb loading plant at Crab Orchard Lake, near here. M. J. Boyle & Co., 1744 North Mozart street, Chicago, and S. A. Healey, 221 North LaSalle street, Chicago, are contractors. Sherwin-Williams Defense Corp., 101 West Prospect avenue, Cleveland, will operate on a cost-plus basis. (Noted Aug. 18.)

CHICAGO—Charles Bruning Co. Inc., 4700 Montrose avenue, manufacturer of drafting and engineering supplies and equipment will build a two-story addition of 24,000 square feet at its new plant completed last year. Addition will cost about $85,000. Victor L. Charn, 332 South LaSalle street, is architect.

CHICAGO—American Electric Fusion Corp., 2610 West Diversey avenue, manufacturer of welding equipment, will build an addition covering 20,000 square feet, costing $60,000, with $40,000 additional for equipment. Large contract for defense products caused expansion.

MAYWOOD, ILL.—Chicago Metal Hose Co., 1315 South Third street, manufacturer of flexible metal hose, has started expansion program, including new facilities at Elgin, Ill., where site has been bought. Tentative plans have been made for first unit of plant, covering 40,000 square feet. Engineering Systems, 221 North La Salle street, Chicago, is engineer.

MOLINE, ILL.—Deere & Co. has given contract for heat treating plant and storage building to A. Carlson Co., Moline, at about $104,000.

WAPELLO, ILL.—Bond election will be held Sept. 23 to provide funds for a waterworks system costing about $50,000. Warren & Van Praag, Decatur, Ill., are engineers.

WOODSTOCK, ILL.—City has given contract to S. J. Reynolds, 2223 West Ogden avenue, Chicago, for improvements to municipal power plant, including new boiler, stoker, piping, etc., at $150,110.

Alabama

MOBILE, ALA.—United States Maritime Commission, Fourteenth and Constitution avenue, Washington, has let eight shipways, shops, etc., to Alabama Shipbuilding Dry Dock Co., Mobile, to cost about $8,000,000.

Mississippi

PASCAGOULA, MISS.—United States Maritime Commission, Fourteenth and Constitution avenue, Washington, has awarded two shipways, shops, etc., to Ingalls Shipbuilding Co., Pascagoula, Miss.

Missouri

JOPLIN, MO.—City is having surveys made for construction of a sewage disposal plant, plans and cost not yet available.

LOUISIANA, MO.—War department, will start construction at once of $16,750,000 anhydrous ammonia plant, to be operated by Hercules Powder Co., Wilmington, Del. Bechtel, McCone & Parsons Corp., 601 West Fifth street, Los Angeles, is contractor, on cost-plus fixed-fee basis.

NEOSHA, MO.—City is having preliminary plans prepared for a sewage disposal plant and filtering plant, with sewer and water systems. H. T. Lawrence, 3244 Northwest Fourteenth street, Oklahoma City, Okla., is engineer.

SIKESTON, MO.—Hans Machine Works will build a one-story 60 x 120-foot machine shop costing about $40,000.

ST. LOUIS—American Can Co., New York, has given contract to Norris Construction Co. for construction of $2,000,000 plant on South Kingshighway. (Noted June 30.)

Oklahoma

TULSA, OKLA.—City has applied to PWA for funds to finance sewage disposal plant, eight or nine buildings, on Arkansas river, south of Tulsa. W. R. Wooten is city engineer. Victor H. Cochrane, Wright building, Tulsa, is consulting engineer. Cost is estimated at $1,100,000.

Wisconsin

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350-S

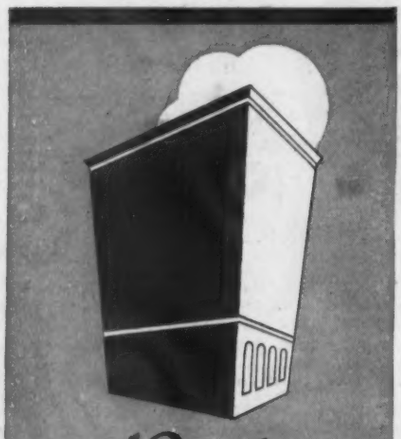
Drive Auto Co. will build a one-story 100 x 120-foot assembly plant addition.

KNOWLTON, WIS.—Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., is considering plans for a hydroelectric project at cost of about $1,500,000.

MANITOWOC, WIS.—E. Walter, city engineer, is having plans prepared for a complete filtration plant and water storage tank, to cost about $275,000.

Nebraska

LEXINGTON, NEBR. — Central Nebraska Public Power District has filed application with state railway commission for permission to construct 88 miles of 115,000-volt transmission line from Johnson No. 2 powerhouse to Grand Island, Dawson and Hall counties.



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Minnesota

MAPLE LAKE, MINN.—Rural Cooperative Power Association, N. E. Ryall, manager, plans two additional generating units, power plant, distributing system and additional transmission lines. REA has allotted $185,000.

Iowa

DES MOINES, IOWA—Des Moines Electric Light Co., C. A. Leland, president, and Iowa Southern Utilities Co. will construct a $250,000 power transmission line from Creston to Adel, 31 miles, including an $11,000 switching station at Adel.

DURANT, IOWA—L. Schneckloth, town clerk, will receive bids until Sept. 30 for construction of a municipal light and power plant and equipment, to cost about $115,000. Stanley Engineering Co., Muscatine, Iowa, is consulting engineer. (Noted Aug. 4.)

HAWARDEN, IOWA—City, Elmer H. Ericson, clerk, has had plans made for a power plant addition and installation of 1000-kilowatt generator, at cost of $92,000. Buell & Winter, Insurance Exchange building, Sioux City, Iowa, are engineers.

MODALE, IOWA—City has approved $4975 bond issue to finance new wells, mains and water treatment plant.

MURRAY, IOWA—City will take bids about Oct. 15 on municipal light and power plant, equipment and distribution system, to cost about $80,000. A. S. Harrington, Baum building, Omaha, Nebr., is consulting engineer.

PAULINA, IOWA—City, G. W. Harris, clerk, is taking bids to Sept. 22 for 100,000-gallon reservoir, reconditioning existing well with motor-driven turbine pumping equipment and fittings. Buell & Winter, Insurance Exchange building, Sioux City, Iowa, are engineers.

SIOUX CITY, IOWA—Swift & Co., Chicago, plans a packing plant addition to cost about $225,000.

WAVERLY, IOWA—City has given contract to Worthington Pump & Machinery Co., 400 West Madison street, Chicago, at $60,193, for a municipal power plant, including diesel engine generating set, etc. (Noted Aug. 11.)

Montana

FORT PECK, MONT.—War department, engineer corps, 10 East Seventeenth street, Kansas City, Mo., will call bids soon on superstructure of powerhouse, including turbine, butterfly valves, indoor cubicles and switchboards, for Fort Peck.

California

LOS ANGELES—Pacific Iron & Steel Co., 11633 South Alameda street, will build a shop 78 x 300 feet, to cost about $12,000.

LOS ANGELES—Steel Sheets Inc. has been incorporated with 2500 shares no par value by J. S. Mullin and associates. Mathes & Sheppard, 458 South Spring street, are representatives.

LOS ANGELES—P. & M. Machine Works, 16437 South Western avenue, Gardena, Calif., Los Angeles suburb, has been formed by Carl A. Mohr, Albert T. Porterfield and Clarence H. Mathison.

LOS ANGELES—W. H. Kinney and Roland T. Kinney have formed Kinney Aluminum Co. to deal in nonferrous metals.

SAN FRANCISCO—Stuart Oxygen Co., 211 Bay street, is having plans prepared for a plant addition costing about $40,000.

Washington

ABERDEEN, WASH.—Pacific Titanium Products Co. plans installation of a 25-ton crusher and concentration plant near Elma, Wash., to produce titanium oxide from large deposits nearby. F. H. Adams and N. A. Branson are interested. George C. Westby, Seattle, is consulting engineer in charge of mining operations, which will involve power shovels for strip mining.

ABERDEEN, WASH. — Greene Electric Furnace Co., Seattle, experimenting with a pilot plant, is considering building a manganese processing plant in the Grays Harbor district, contingent on developing sufficient manganese ore to justify.

Canada

WINNIPEG, MAN.—MacDonald Bros. Aircraft Co. Ltd., has given contract to Bird Construction Co., Winnipeg, for a plant addition costing $35,000, without equipment.

WINNIPEG, MAN.—S. & S. Aircraft Ltd., 215 Watt street, has let contract to H. E. Gibson & Co., 631 Strathcona avenue, for a plant addition costing $90,000, without equipment.

CHATHAM, ONT.—Chrysler Corp. of Canada Ltd., Tecumseh street, Windsor, Ont., will take bids soon for $150,000 plant addition here. Structural steel has been awarded to Canadian Bridge Co. Ltd., Walkerville, Ont.

HAMILTON, ONT.—Aerovox Canada Ltd., 43 Catharine street South, manufacturer of electric condensers, etc., will take bids soon for an addition costing $60,000, with equipment. Hutton & Souter, 36 James street South, are architects.

OTTAWA, ONT. — Ontario Hughes-Owens Co., Ltd., 527 Sussex street, manufacturer of tools and machinery, will build plant addition costing $40,000, without equipment. General contract has been given to Ross Meagher, 7 Echo drive.

OTTAWA, ONT.—Ottawa Car & Aircraft Ltd., 301 Slater street, manufacturer of aircraft and parts, will build an addition costing $144,000, without equipment and has given contract to Doran Construction Co. Ltd., 78 Bank street.

TORONTO, ONT.—W. D. Beath & Sons Ltd., 394 Symington avenue, makers of steel drums and tanks, will build plant addition costing $80,000, without equipment. Contract has been given to J. Robert Page, 18 Toronto street.

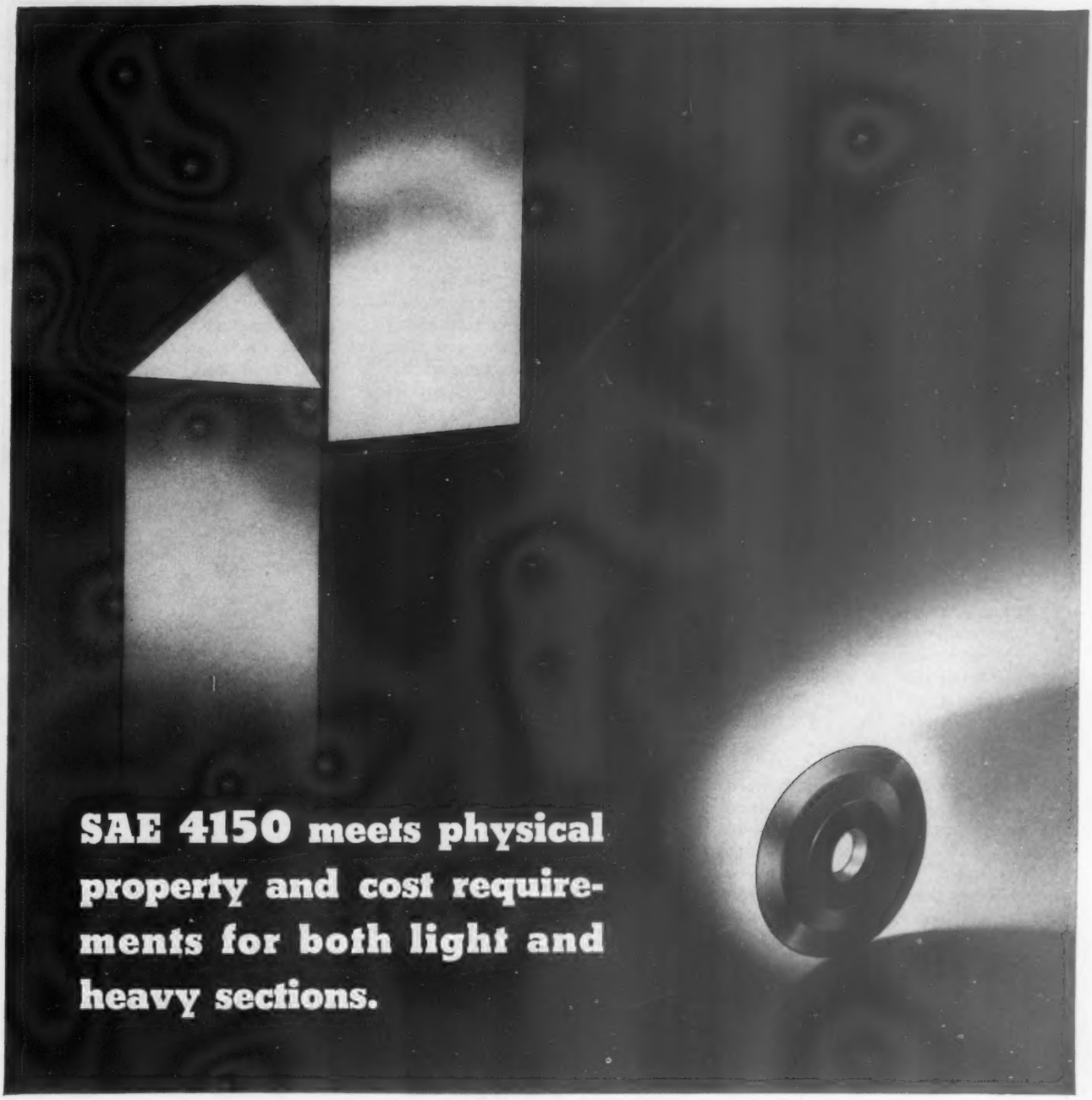
TORONTO, ONT. — DeHavilland Aircraft Ltd. has let contract to A. W. Robertson Ltd., 57 Bloor street West for a plant addition in North York township, costing $770,000, without equipment.

TORONTO, ONT. — Standard Cycle Products Ltd., 407 Logan avenue, manufacturer of bicycles, etc., has let contract to R. J. Hibbs Construction Co., 15 Trent avenue, for a $50,000 plant addition.

LACHINE, QUE.—Dominion Engineering Co. Ltd., First avenue, manufacturer of machinery and tools, will build a plant addition costing $35,000, without equipment.

ST. LAURENT, QUE.—Noorduyn Aviation Ltd., manufacturer of aircraft, has let contract to Richard & E. J. Ryan Ltd., Montreal, Que., for a plant addition costing $200,000, without equipment.

ST. LAURENT, QUE.—Robert Mitchell & Co. Ltd., 750 Belair avenue, Montreal, Que., will take bids soon for a plant addition costing $50,000, without equipment.



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Behind the Scenes with STEEL

New Subscriber

■ From Richard S. Bennett of Salt Lake City, Utah last week came a letter asking that a subscription to STEEL be entered in. his name. Since Mr. Bennett hadn't indicated any company connection we were curious to know what his interest in STEEL might be. On a letterhead of the Bennett Glass & Paint Co., Mr. Bennett replied:

Because of the importance of steel in the present economy, and because STEEL *magazine is an authoritative source of information regarding steel, it was recommended to me by a subscriber as a "must."*

Versatile

■ And in the same mail came a fascinating proposition from a local "secret service" organization—an open letter to prospective clients, they called it. They offer 24-hour service on shadow work, expert drivers for trailing, psychologist and public relations service, body guards and special police for football games or weddings, secret operatives for serving papers or locating missing persons and a special deluxe industrial service for sabotage prevention. If you have any "jobs" you want done on the q. t. we'll be glad to put you in right.

Coming Next Week

■ Next week Guy Hubbard, Machine Tool Editor, hearkens back to Dr. Russell Conwell's famous parable, "Acres of Diamonds" in getting across what can be and is being done in many plants to get out production with present equipment. Don't miss his article "Digging for Hidden Possibilities in Existing Shops."

Genuine Or None

■ Users of steel are sometimes slow in keeping pace with changed processes and kinds of iron and steel, being most conspicuously slow as to descriptions which are now obsolete. Thus many are still talking about wrought iron this and that, when as a matter of fact steel has supplanted most every form of wrought iron. Architects often specify wrought iron pipe for railings but what they get is steel. However, if they say *genuine* wrought iron pipe, then the actual specifications are heeded.

Keeping In Step

■ STEEL, on the other hand, makes every possible effort to keep in step with changes and developments in the market. For example, within just the past few weeks STEEL's market price tables have been double checked with all the leading producers and revisions or additions have been made wherever necessary. Thus the stainless steel table has been expanded to include all popular grades, and the thin flat rolled steel and bar prices brought into direct line with existing conditions. Also, if you haven't checked it yet, study STEEL's new scrap price table which gives a full breakdown of the maximum prices fixed by OPA and detailed explanations on shipping points, commissions, export prices, etc. The complete table has been approved officially by OPA.

Customer Relations

■ Here's a pretty clever little card that Eastman Mfg. Co. up in Manitowoc, Wis., has just sent out to all its customers:

WE AIN'T MAD AT NOBODY

Just because an old, valued supplier don't give us the service he used to—We Ain't Mad. We know he's doing his best, that he values our account, and realizes he'll need us when this crazy period is over as much as we now need him.

ALSO

If some friend should give us hell because of the service we're giving him—service we too don't like—We Ain't Mad. We know he's trying to do a tough job too. We know he realizes what we're up against, that we're doing our best and that we know we'll need him just as much later on as he now needs us,

SO

If you don't mind we'll all just keep plugging along—"on the beam."

Reverse Selling

■ But yet we understand that sales staffs in many companies are still selling—but they're not selling customers. The branch offices are selling the main offices. In other words, each branch office uses its best wiles and Sunday suit of clothes to persuade the main office brass hats that their orders should get moved right on through. Of course, on the other hand, a few salesmen we know have devoted most of the summer to lowering their golf handicaps a stroke or two.

Obeying Orders

■ You may have heard the story of the argumentative Irishman who was fired from the Bethlehem Steel Corp. and to avoid discussion, the discharge was given in a letter. The next day Pat was missing but five days later there he was back at work. "Didn't you get my letter?" asked the boss. "Yes, Sor, I did." "Didn't you read it?" "I did that, inside and out! On the inside ye said I was fired, and on the outside ye said 'return to Bethlehem Steel Corp. in five days'."

Mr. Rogers' Friends

■ Two things seem to have been pretty well established since STEEL two weeks ago noted that William A. Rogers, co-founder of Rogers, Brown & Co., Buffalo recently celebrated his ninetieth birthday. No. 1, STEEL gets read, and No. 2, Mr. Rogers has a host of friends—because he has to date received 271 letters and 31 congratulatory telegrams.

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